To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Fri 1/8/2016 10:05:20 PM
Subject: FW: RAO comment
Draft responses to RRB-CSTAG Recommendations 2 Jan 8 2016.docx

FYI…

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Fonseca, Silvina
Sent: Friday, January 08, 2016 4:03 PM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>
Subject: RE: RAO comment

Hi Cami,

I just finished my drafts and sent it to Anne. I've attached them here. I looked at the Lower Duwamish responses regarding the fish tissue and it was not helpful. I spoke with Amy and we crafting something that will give us flexibility with respect to PRGs and measures. Let me know what you think.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Grandinetti, Cami
Sent: Friday, January 08, 2016 3:47 PM
To: Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Subject: RAO comment

Silvina—I haven’t meant to leave you holding the bag on these comment responses. With respect to the comment that asks how we will use fish tissue, I know you were working on a response and I’d like to work with you on that. Do you have something drafted or do you want me to write something up?

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

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To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Mon 1/4/2016 4:36:30 PM
Subject: FW: DELIBERATIVE -- REVISED DRAFT RESPONSE to 404 NRRB comment
PDX Draft Response to 404 FS Comment.docx

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Cora, Lori
Sent: Thursday, December 31, 2015 3:43 PM
To: Christopher, Anne <Christopher.Anne@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>
Cc: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; DeMaria, Eva <DeMaria.Eva@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Subject: DELIBERATIVE -- REVISED DRAFT RESPONSE to 404 NRRB comment

Attached is my revised response to the 404 comment in the NRRB Revision 6 that Amy sent out today. I coordinated with DOI and NOAA Trustee attorneys on this answer. Note there are gaps Kristine and/or Sean need to fill in and there needs to be accuracy check on what I am saying the FS says.

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | **Region 10**
P: (206) 553.1115 | **F: (206) 553.1762** | **cora.lori@epa.gov**

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To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Anderson, RobinM
Sent: Fri 10/16/2015 8:32:07 PM
Subject: FW: 2015-10-14 NRRB Package.docx
2015-10-14 NRRB Package.docx

From: Fonseca, Silvina
Sent: Thursday, October 15, 2015 4:26 PM
To: Anderson, RobinM
Subject: 2015-10-14 NRRB Package.docx

Can you look through the PTW section and let me know if there is any more information or text needs to be included. This is for the RRB. I am looking at it now.

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Mon 9/28/2015 8:52:50 PM
Subject: RE: Portland Harbor Discussions Q and As PTW

Robin I think these look good, may need a bit of tweaking but a great starting point. I am going to send to Kristine and get input from her.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Anderson, RobinM
Sent: Monday, September 28, 2015 3:54 PM
To: Fonseca, Silvina
Subject: Portland Harbor Discussions Q and As PTW

1. What is the basis for the PTW determination and how does this comport with Agency policy?

2. What volume of waste is considered for treatment as part of the draft RI/FS?

3. What volume of waste is either a.) required to be treated due to a regulatory requirements other than CERCLA, or b.) considered for treatment as a result of it being a PTW.

4. What is the basis for needing or considering treatment for waste to be shipped off-site?

4.0 DETAILED ANALYSIS OF ALTERNATIVES

This section provides a detailed analysis of individual alternatives against each of nine evaluation criteria and a comparative analysis that focuses upon the relative performance of each alternative against those criteria. The first two criteria are threshold criteria that must be met by each alternative. The next five criteria are the primary balancing criteria upon which the analysis is based. The final two criteria are referred to as modifying criteria and evaluate state and community acceptance. The two modifying criteria will be evaluated following comments received during the public comment period and will be presented in the ROD.

The two **threshold criteria** are:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs

The five **balancing criteria** upon which the detailed analysis is based are:

- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost

The two **modifying criteria** are:

- State and Acceptance and Tribal Consultation and Coordination
- Community Acceptance

4.1 EVALUATION PROCESS AND EVALUATION CRITERIA

This section provides a brief description of the nine evaluation criteria and the evaluation process used in the detailed analysis.

4.1.1 Spatial Scales

The analysis was conducted on several spatial scales. The evaluation of benthic risk was conducted on a point-by-point scale based on the empirical and predicted toxicity since these receptors have little movement in the site. The evaluation for other receptors was conducted by developing relevant exposure scales. The site was first subdivided into nearshore areas, the navigation channel, and Swan Island Lagoon resulting in the following four river segments:

- West shore to west navigation channel boundary
- Navigation channel
- East navigation channel boundary to the east shore
- Swan Island Lagoon

This subdivision is a preferred method given the differing sediment dynamics and hydrodynamics of the shorelines and lagoon, current and future uses (such as navigation channel), and the preference of many receptors for shoreline habitat. Subdivision will therefore allow for a more precise analysis of risk reduction for each alternative in this FS.

Since there is great uncertainty as to where the receptors actually spend their time, and thus exposed to the contamination in the sediment, a concept of a rolling river mile was used. Each of these river segments were evaluated on three spatial scales to account for the various species exposed to the contamination as follows: 1) a spatial scale of 0.2 RM was used for RAO 5 because spatial scales of ecological receptors ranged from a point to 1 RM, 2) a spatial scale of 0.5 RM was used for RAO 1 (sediment only) for the fisher direct contact exposure, and 3) a spatial scale of 1 RM was used for RAOs 2 and 6 for the dietary exposure for humans and ecological receptors that consume river species (fish and shellfish). These spatial scales are generally consistent with exposure units evaluated in the baseline human health and ecological risk assessments. A rolling river mile is developed by selecting a starting point in the river; RM 1.9 was selected as the starting point based on information presented in the RI report. That river mile is the centroid of the first exposure unit and a SWAC is developed and plotted on a graph presenting SWAC versus river mile. The centroid is then advanced 0.1 RM and repeated.

As this FS focusses on controlling or removing source areas in the river, individual regions of the river within the Site that present unacceptable risks were designated as SDUs. The effectiveness of remedial alternatives developed in this FS will be evaluated in part by determining the extent of risk reduction each alternative accomplishes in each SDU. SDUs are approximately 1 mile long, corresponding to the approximately 1 mile exposure area over which recreational fishing and the home range of species such as smallmouth bass, hooded merganser, osprey, bald eagle and mink. Therefore, SDUs were developed from the rolling 1 RM curves.

Surface sediment data from the FS database were used in the development of SDUs. To determine where to set the SDU boundaries, surface sediment data were initially assigned to the nearest tenth of a river mile based on their location. Within each tenth of a river mile in each of the four river segments identified above, a SWAC was calculated using values in the database. These rolling river mile averages for the west side, navigation channel, east side, and Swan Island Lagoon were plotted and displayed graphically, and are presented on **Figures 4.1-1(a)** through **4.1-1(ac)**. SDUs were generally identified in areas where focused COC rolling river mile averages peaked across the Site as shown on the figures. Some adjustments were made to the SDU boundary to include the majority of the peak. Additional SDUs were added to address areas where multiple contaminants and/or benthic risk were identified at elevated concentrations between RM 4 and 6. Based on the FS dataset a total of 13 SDUs were established. Locations of the SDUs and the predominant contaminants are shown on **Figure 4.1-2**. **Table 4.1-1** provides summary information for each SDU, including location in the river, length, acres, basis for establishing the SDU and key focused COCs within each SDU.

4.1.2 Modeling Remedial Alternatives

In the draft FS, the LWG provided a hydrodynamic and sediment transport (HST) model. EPA had this model peer reviewed (Jay 2012, Hayter ??). In summary, the main issues with the LWG's HST model are:

- The HST model is EFDC and SEDZLJ are not coupled in the sense that changes in bed elevation (due to deposition and erosion) predicted by SEDZLJ are not coupled back into the EFDC.

- The HST model has not been fully calibrated or validated. The calibration of the HST model was limited.

    - The calibration of the sediment transport model rests entirely on attempts to reproduce observed 2003 to 2009 erosion and deposition patterns, a time period without a major flood. The 2002 bathymetry was not used in the calibration.

    - There has been no systematic comparison of modeled and observed water levels. The comparisons of means used for the HST model is not appropriate in a tidal water way. Moored ADCP time series data have not been used in evaluating model behavior, even though such data have been available since 2003 at the Morrison Street Bridge. The velocity calibration rests on comparisons with lateral profiles on three different days. The HST model has not demonstrated that tides decrease in the correct manner as flows increase, and that overtides vary in the correct manner with flow. The HST model did not demonstrate that it was capable of correctly simulating tidal flows in the lower Willamette.

    - Separate calibration and analysis periods are needed to fully validate the EFDC circulation modeling. Each period should be at least a year long and encompass both flood periods and low-flows.

  - There has been no calibration or validation of contaminant concentrations in the system.

  - The equation used for silt and clay settling velocity is appropriate for systems with large spatial scales and slow motions (like most lakes and reservoirs), but is not appropriate for river systems. Unrealistic results may occur both during high-flow periods and in times and places where tidal currents reverse, because shear and concentration gradients will change rapidly in both cases. Further, the equation prevents sediments from settling during periods of slack water when currents reverse by taking the settling velocity to zero as the current slows, which is clearly unrealistic.

- The HST model used sediment loads based on the Morrison Street Bridge. The sediment load measured at the Morrison Street Bridge does not represent the load to the Lower Willamette River, because Morrison Street Bridge measurements are affected by deposition and erosion between Oregon City and Portland Harbor. It is likely that the load during low-flow (depositional) periods is underestimated, while the load during high flow periods may be overestimated. The correct use of the Morrison Street Bridge data and rating curve is for validation of the model predictions, not as a boundary condition, because the sampling is within the system, not at the boundary. This problem can only be remedied after collection of an appropriate data set at Oregon City.

- The HST model does not accurately account for the complex circulation patterns of Multnomah Channel.

- While the physical CSM emphasizes the importance of bedload transport indicating that about half the sediment load into the site occurs from bedload transport, the HST model does not include this transport process.

- There are three types of flood events that occur in the Willamette River. The rain-on-snow flooding event is particularly important because flows rise rapidly and the supply of fine sediment from upriver is large leading to the potential for erosion (and export) followed by deposition. The CSM for the HST model did not demonstrate that it was capable of correctly simulating the various flood events in the lower Willamette. The HST model division of the supply between fines and sand is incorrect for high flows, in part because it does not consider the very large supply of clay material, which is likely most prominent during rain-on-snow floods.

- The HST model used a 100-year flood volume of 360,000. A 100-year flood volume of about 500,000 cfs is more realistic and represents the 1861 flood event.

- The size of the HST grid cells (200 m to 25 m) is quite large and is likely to include quite variable depths and not represent processes well. The effect of the size of grid cells has not been quantified for this modeling study. Therefore, the limited grid resolution of the HST model limits the accuracy of mapping of some remedial alternatives onto the model, decreasing the accuracy of related simulations. Appendix Ha of the draft FS acknowledges that the grid is too coarse to accurately map the remedial alternatives onto the bed.

- The HST model excluded the larger USGS 1962-1965 daily data set that includes detailed observations for the December 1964 flood, including multiple observations on the days of peak sediment load. This data set also provides percent sand data, so that the sediment load can be correctly divided into sand and fines transport, and the fines load needs to be divided into silt and clay inputs.

EPA also compared the results of the HST model to the 2003-2009 bathymetry data. A statistical analysis using simple regression was conducted to determine the predictability of the HST model. The methodology is presented in Appendix F and results are presented on **Figure 4.1-3**, where each graph is an SDU and each dot is an HST grid cell. The results indicate that there is no correlation between the HST model predictions and the bathymetric change between 2003 and 2009 and that the model bias is always positive (meaning that it predicts more deposition than was actually measured). EPA attempted to conduct an MNR analysis using the Sed CAM model, but ran into the same issues that were identified in the HST model.

Further, the HST model results are inconsistent with the CSM for this site. The HST model predictions show significant concentration reductions occurring within the first 10 years. However, the contamination was released into the river 30-80 years ago. If the HST model predictions were accurate, then the concentrations measured in the surface sediment would not have been observed during the remedial investigation.

For all the reasons stated above, EPA was unable to conduct adequate quantitative predictions for the time from when construction is complete until the time RAOs are met. Consequently, the evaluation will be made qualitatively and more emphasis will be made on the concentration reductions and residual risk at the completion of construction.

4.1.3 Overall Protection of Human Health and the Environment

This criterion draws on the assessments conducted under other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. It describes how risks associated with each exposure pathway would be eliminated, reduced, or controlled through treatment, engineering or institutional controls.

Human Health

The protection of human health is assessed in this FS by comparing the PRGs for RAOs 1 (sediment only) and 2 to projected contaminant concentrations in sediment at the completion of construction. To determine whether the tissue PRGs for RAO 2 are achieved, predicted concentrations in sediment are used to estimate concentrations in fish and shellfish tissue. Where the estimated tissue concentrations exceed PRGs for RAO 2, then it will be assumed that a fish consumption advisory will be necessary to provide protection in the short- and/or long-term.

A qualitative assessment of protectiveness for RAOs 1 (beaches), 3 and 4 will be conducted in this FS, as there are no current means to quantitatively assess the effectiveness of in-water remedial activities on overall concentrations in beaches, surface water, and pore water. The assessment will be conducted at the same time frames as for RAOs 1 and 2.

Environment

The protection of the environment is assessed in this FS by comparing the PRGs for RAOs 5 and 6 to the projected concentrations at the completion of construction.

A qualitative assessment of protectiveness for RAOs 7, 8, and 9 will be conducted in this FS, as there are no current means to quantitatively assess the effectiveness of in-water remedial activities on overall concentrations in surface water. The assessment will be conducted at the same time frames as for RAOs 5 and 6.

4.1.4 Compliance with ARARs

Alternatives are assessed as to whether they meet applicable or relevant and appropriate federal and state requirements (ARARs) (see Section 2.1) unless such ARARs are waived under CERCLA Section 121(d)(4). Compliance with ARARs is determined by whether an alternative will meet all of the chemical-specific, action-specific, and location-specific applicable or relevant and appropriate requirements and/or those that are to be considered (TBC) identified in **Tables 2.1-1** through **2.1-3**.

4.1.5 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of an alternative to maintain reliable protection of human health and the environment over time, once clean-up levels are met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of engineering (remedial technologies) and institutional controls to manage those risks. The evaluation of long-term effectiveness and permanence evaluation starts at the time RAOs and PRGs are met.

4.1.5.1 Magnitude of Residual Risks

The magnitude of residual risks for each alternative includes both human health and ecological risks.

Human Health

The process of evaluating estimated future risks uses the methodology and assumptions, presented in the baseline risk assessment. For purposes of comparing relative reductions in risks, carcinogenic risks and non-carcinogenic health hazards are estimated for the most protective RME scenarios only. Arsenic, mercury, BEHP, PDBEs, and pentachlorophenol are not included in the evaluation of future risks via consumption of fish because no relationship has been established between concentrations in sediment and predicted concentrations in fish tissue.

Exposure point concentrations (EPCs) for post-remedial exposures are based on modeled projections of contaminant concentrations in sediment, representing the range of predicted concentrations as the site reaches equilibrium. Although COC concentrations may exhibit an overall decreasing trend over time, actual concentrations would continue to fluctuate due to storm-driven resuspension of contaminated sediments (at temporally and spatially varying rates and concentrations) from within, upstream, or downstream of the site.

Ecological

The assessment of residual ecological risks relies on the predicted sediment concentrations at the completion of construction and at long-term equilibrium. Ecological hazard quotients are calculated using the estimated sediment concentrations and the risk-based PRGs for RAOs 5 and 6, consistent with the process used in the BERA. Residual risks are only calculated for the most sensitive receptor. Additionally, benthic risk is evaluated by determining the percentage of measured or predicted benthic toxicity points addressed by the construction activities.

4.1.5.2 Adequacy and Reliability of Controls

This factor assesses the adequacy and suitability of engineering and institutional controls that are used to manage untreated wastes or treatment residuals remaining at the site. Containment systems (caps and CDF) and institutional controls will be assessed to determine that contaminant exposures, including residuals, to human and ecological receptors are within acceptable levels.

Repairs, maintenance, and other activities conducted in perpetuity will be necessary for various caps and the on-site CDF, if constructed. Monitoring, including measurement of COC concentrations in sediment, water column, pore water, groundwater and biota is another long-term component of the remedial alternatives. Monitoring of caps will be conducted to ensure and document the integrity and effectiveness of the cap in isolating contaminants. Replacement of caps is assumed to be replaced incrementally as O&M during a hundred year period.

Upland source control measures designed to prevent the migration of contamination to the river will also need to be evaluated long-term; however, this FS assumes that all upland sources are adequately controlled and will not evaluate their effectiveness. Upland source control measures designed to prevent the migration of contamination to the river will also need be to evaluated for necessary repairs and maintenance performed under 5-year reviews of the CERCLA action.

4.1.6 Reduction of Toxicity, Mobility, and Volume through Treatment

CERCLA expresses a preference for remedial alternatives employing treatment technologies that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances. This evaluation will primarily focus on PTW, but will also include reduction in mobility of other contaminants by confinement under a cap, in a landfill or in a CDF.

4.1.7 Short-Term Effectiveness

Short-term effectiveness addresses the time needed to implement the remedy and any adverse impacts that may be posed to the community, workers, and the environment during construction and operation of the remedy until cleanup levels and RAOs are achieved.

The evaluation of short-term effectiveness includes the risks to workers and the community from transport of wastes and borrow materials, risks to workers on dredges or barges, measures to address those risks, numerical estimates to demonstrate that residuals can be successfully managed during dredging or capping activities, and BMPs to mitigate environmental impacts, such as emissions or noise.

Relevant experience at other sites are used to support implementation timeframes for in-water technology assignment components. Additionally, quantitative dredge production calculations are performed based on Schroeder and Gustavson (2013). Capping implementation timeframes are based on a review of similar types of capping projects and not specifically calculated for this project.

Time to achieve RAOs and PRGs will be quantitatively evaluated at the completion of construction and qualitatively evaluated post construction (see discussion in Section 4.1.2 regarding limitations in the ability to evaluate this quantitatively). This evaluation will be conducted at varying spatial scales relevant to the RAOs and within SDUs.

4.1.8 Implementability

The technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation is evaluated under this criterion. Metrics used to gauge the relative magnitude of technical and administrative implementability of the alternatives include the surface areas actively managed for all active technologies and volumes. Areas and volumes managed are considered proportional to the degree of implementation difficulty. Acreage subject to MNR is also considered because it requires significant administrative effort over the long term to oversee and coordinate sampling and data evaluation as part of long term monitoring.

4.1.9 Cost

Cost estimates are developed according to *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (USEPA 2000). The levels of detail employed in making these estimates are conceptual but are considered appropriate for differentiating between alternatives. The cost estimates are based on the best available information regarding the anticipated scope of the respective remedial alternatives.

Cost estimates are developed for each remedial action alternative based on the RI data to define the scope of each alternative. Due to the uncertainty in RI/FS data, the accuracy of cost estimates is less than estimates developed later in the design phase. The types of costs estimated include the following: (1) Capital costs, including both direct and indirect costs (2) Annual operations and maintenance costs; and (3) Net present value of capital and O&M costs (40 CFR 300.430 (e)(9)(iii)(G)). Remedial action alternative cost estimates for the detailed analysis are intended to provide a measure of total resource costs over time ("life cycle costs") associated with any given alternative. Cost estimates are developed with expected accuracy ranges of -30 to +50 percent.

Capital Costs: Capital costs are expenditures required to construct each alternative. They are exclusive of costs required to operate or maintain the remedial action throughout its lifetime. Capital costs, direct and indirect, consist primarily of expenditures initially incurred to build or install the alternative. Direct capital costs include all labor, equipment, and material costs, associated with activities such as mobilization/demobilization; monitoring; site work; installation of dredging, containment, or treatment systems; and disposal. Indirect capital costs include contractor markups such as overhead and profit and expenditures for professional/technical services that are necessary to support construction and installation of the remedial action.

Annual Operation and Maintenance (O&M) Costs: These are post-construction costs necessary to ensure or verify the continued effectiveness of each remedial alternative. These costs are estimated on an annual basis and include all labor, equipment, and material costs, and monitoring. Annual O&M costs also include expenditures for professional/technical services necessary to support O&M activities.

Periodic Costs: These costs occur only once every few years (such as 5-year reviews and equipment replacement) or expenditures that occur only once or a few times during the entire O&M period or remedial time frame (such as at site closeout or remedy component replacement). These costs may be either capital or O&M costs, but because of their periodic nature, it is more practical to consider them separately from other capital or O&M costs in the estimating process.

Present Value Cost: The present value cost represents the amount of money that, if invested in the initial year of the remedial action at a given discount rate, would provide the funds required to make future payments to cover all costs associated with the remedial action over its planned life. Future O&M and periodic costs are included and discounted (reduced) by the appropriate present value discount rate over the period of analysis selected for each alternative. The present value was calculated based on a seven percent discount rate as recommended in *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (USEPA 2000). Also, per guidance, inflation and depreciation are not considered in preparing the present value costs.

The alternatives retained for detailed analysis all have containment components and thus have indefinite project durations and likely require perpetual maintenance. The assumed period of analysis used to develop estimates of present value costs for each alternative is 100 years.

A "no-discounting" scenario is also included for the present value analysis of each alternative as recommended by the guidance for long-term projects (for example, project duration exceeding 30 years). A non-discounted constant dollar cash flow over time demonstrates the impact of a discount rate on the total present value cost and the relative amounts of future annual expenditures. Non-discounted constant dollar costs are presented for comparison purposes only and should not be used in place of present value costs in the Superfund remedy selection process.

To support the detail analysis and evaluation of remedial alternatives, a sensitivity analysis was also performed within the cost estimate for each alternative to determine those costs that have the greatest impact on the overall cost (see Appendix G).

4.1.10 State Acceptance and Tribal Consultation and Coordination

4.1.10.1 State Acceptance

This criterion provides the government of the state where the project is located with the opportunity to assess technical or administrative issues and concerns regarding each of the alternatives. It also provides whether the State concurs with EPA's preferred alternative. State acceptance is not addressed in this FS but will be addressed in the ROD. Input and review of major RI/FS documents by the State of Oregon was sought and considered throughout the development of the FS.

4.1.10.2 Tribal Consultation and Coordination

Although not part of the NCP criteria, under current EPA policy[1], EPA consults and coordinates with Tribes, when appropriate throughout the Superfund process. EPA has been coordinating, throughout this FS, with the six federally recognized tribes[2]. In addition to the ongoing coordination, under EPA's policy, parallel to the State, the Tribes will be given the opportunity to provide technical and administrative issues and concerns regarding each of the alternatives. EPA will also formally consult on the remedy decision, if formal consultation is requested by any of the Tribes.

4.1.11 Community Acceptance

The alternatives evaluated in this FS and the preferred remedy that will be identified in the Proposed Plan will be presented to the public. Based on comments received during the public comment period, community acceptance will considered and addressed in the ROD. Issues raised by the community will be discussed and addressed in the Responsiveness Summary Section of the ROD. Input from the public, potentially responsible parties and interested stakeholders was sought and considered throughout development of the FS. This occurred through monthly Community Advisory Group (CAG) meetings, meetings with the LWG, in ListServ notices, publication of information on the project website, and other activities consistent with the Community Involvement Plan (USEPA and ODEQ 2002). This will continue throughout the rest of the Superfund process.

4.2 DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

4.2.1 Alternative A: No Action

4.2.1.1 Overall Protection of Human Health and the Environment

Alternative A would not be protective of human health and the environment. Under Alternative A, the resuspension of contaminated sediments in the site would continue to impact surface sediments, surface water, and biota so that the unacceptable risks to humans and the environment calculated in the baseline risk assessments would continue for the foreseeable future. Sediment coring data show some decline in surface sediment concentrations over time due to natural recovery processes; however, the slow natural recovery due to the existing sources in the sediment, the persistent nature of the contaminants, and the high bioaccumulative rate result in the decline in concentrations in the system being extremely slow and residual risks are expected to remain at the

[1] EPA Policy on Consultation and Coordination with Indian Tribes, May 4, 2011. Incorporates the Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments", November 2000 and Presidential Memorandum, November 5, 2009.

[2] Tribal governments that have met the statutory requirements of the NCP (300.515(b)) and have signed an MOU with EPA.

currently levels for many decades. Therefore, it would not be reasonable to expect natural recovery processes to achieve protective goals in the foreseeable future.

4.2.1.2 Compliance with ARARs

Alternative A does not comply with chemical-specific ARARs identified for the Site since no further action would be taken to address the contaminated media and risks posed by contaminated media. Under this alternative, location-specific and action-specific ARARs would not be triggered.

Compliance with Chemical-Specific ARARs

No further action would be taken to reduce concentrations of contaminants of concern (COCs) in contaminated media. Key chemical-specific ARARs are:

- Numeric human health and aquatic life water quality criteria set forth in OAR Part 340, Division 41, state-wide criteria and any numeric criteria specific to the Willamette Basin, as enacted through the Water Pollution Control Act ORS 468B.048 and any more stringent national recommended water quality criteria established under Section 304(a) of the Clean Water Act, 33 USC §1314;
- Maximum Contaminant Level Goals (MCLGs) and Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act, 42 USC 300f, 40 CFR Part 141, Subpart O, App. A. 40 CFR Part 143; and
- Cancer and non-cancer risk standards for degree of cleanup required for hazardous substances set forth in Oregon Environmental Cleanup Law ORS 465.315(b)(A) and Oregon Hazardous Substance Remedial Action Rules OAR 340- 122-0040(2)(a) and (c), 0115(2-4).

Chemical-specific ARARs for surface water quality and groundwater quality discharging to the river would not be met. Additionally, the state standards for the degree of cleanup required by remedial actions for both cancer and non-cancer risks would not be achieved. Thus, this criterion would not be met.

Compliance with Location-Specific ARARs

Location-specific ARARs would not be triggered since no new remedial measures would be undertaken.

Compliance with Action-Specific ARARs

Action-specific ARARs would not be triggered since no new remedial measures would be undertaken.

4.2.1.3 Long-Term Effectiveness and Permanence

Under this alternative no further action and no new controls would be put in place to address the contaminated media. Thus, contaminated media not already addressed as part of the previous actions would be left uncontrolled.

Magnitude of Residual Risk

Alternative A would not address source material which would limit the ability for natural recovery processes to occur. Reductions in COC concentration and related risks are expected to occur over time, but the RAOs would not be achieved. Residual risk would be greatest with this alternative.

Adequacy and Reliability of Controls

There are no engineering or institutional controls under this alternative; however fish consumption advisories currently issued by OHA would continue. Studies show that the existing advisories are not sufficiently effective in protecting human health since, despite their presence, some anglers still eat their catch and bring their catch home for their families to eat (May and Burger, 1996; Burger et al, 1999; Kirk-Pflugh et al, 1999 and 2011). In addition, consumption advisories are ineffective in reducing risk to ecological receptors.

4.2.1.4 Reduction in Toxicity, Mobility and Volume through Treatment

Under Alternative A, no actions would be taken. Reduction of COC concentrations in sediments would occur only through natural processes. In addition this alternative does not include monitoring to confirm such reductions. Under this alternative there would be no reduction of toxicity, mobility or volume of contaminants through treatment.

Treatment Processes Used

No treatment processes will be used with this alternative.

Amount Destroyed or Treated

No amount of contaminants will be destroyed or treated.

Reduction of Toxicity, Mobility or Volume

There is no reduction of toxicity, mobility or volume with this alternative.

Irreversible Treatment

No irreversible treatment will occur with this alternative.

Type and Quantity of Residuals Remaining After Treatment

Contaminated sediments will remain.

4.2.1.5 Short-Term Effectiveness

Alternative A assumes no construction activities. Therefore, there are no short-term risks to the community, workers, or the environment from implementation of this alternative. Risks to the community and environment would continue as a result of exposures to the contaminated media.

Community Protection

As Alternative A assumes no construction activities, there no risks to the community associated with implementation. There are continued risks to the community through ongoing exposures to contamination, fish consumption advisories currently issued by OHA would continue under this alternative.

Workers Protection

Since no construction is planned, there are no potential impacts to workers.

Environmental Impacts

Since no construction is planned, there are no environmental impacts associated with implementing this alternative. However, environmental impacts would continue due to ongoing exposures to contaminants left in place.

Time until Action Complete

No construction activities would occur under this alternative and the time until RAOs are attained through natural recovery processes is uncertain.

4.2.1.6 Implementability

There are no implementability issues associated with this alternative.

Ability to Construct and Operate

No construction or ongoing operations would be conducted.

Ease of Doing More Action, if Needed

May require future ROD amendment if conditions warrant further CERLA actions.

Ability to Monitor Effectiveness

Monitoring is not required under Alternative A.

Ability to Obtain Approvals and Coordinate with Other Agencies

No approvals are necessary for implementing this alternative.

Availability of Specialists, Equipment and Materials

No services, equipment, and materials are required.

Availability of Technologies

Technologies to address contaminated media are not required.

4.2.1.7 Cost

There are no costs associated with this alternative.

4.2.2 Alternative B

4.2.2.1 Overall Protection of Human Health and the Environment

4.2.2.2 Compliance with ARARs

Alternative B would comply with ARARs. Chemical specific ARARs would be met over time through implementation of a combination of in-river remedial technologies. Location-specific ARARs for the remedy would be addressed during design and implementation of the alternative. Action-specific ARARs would be achieved by meeting all of the substantive requirements during design, construction, and monitoring of the alternative.

Compliance with Chemical-Specific ARARs

Key chemical-specific ARARs are:

- Numeric human health and aquatic water quality criteria set forth in OAR Part 340, Division 41, state-wide criteria and any specific numeric criteria for the Willamette Basin, as enacted through the Water Pollution Control Act ORS 468B.048 and any more stringent national recommended water quality criteria established under Section 304(a) of the Clean Water Act, 33 USC §1314;
- Non-zero Maximum Contaminant Level Goals (MCLGs) and Maximum Contaminant Levels (MCLs) established under Safe Drinking Water Act, 42 USC 300f, 40 CFR Part 141, Subpart O, App. A. 40 CFR Part 143; and
- Cancer and non-cancer risk standards for degree of cleanup required for hazardous substances set forth in Oregon Environmental Cleanup Law ORS 465.315(b)(A)and Oregon Hazardous Substance Remedial Action Rules OAR 340- 122-0040(2)(a) and (c), 0115(2-4).

Implementation of the alternative in conjunction with adequate source control measures over time are not expected to cause or contribute to exceedances of numeric human health and aquatic life water quality criteria and drinking water MCLGs and MCLs. Oregon's risk standards for degree of cleanup for hazardous substances will be met over time through implementation of the in-river technologies, enhanced monitored natural recovery (EMNR)/in-situ treatment, monitored natural recovery (MNR), monitoring and maintenance, and institutional controls (ICs). Because this alternative relies more heavily on MNR to achieve PRGs and RAOs, the timeframe for compliance with chemical-specific ARARs for all COCs in surface water and groundwater will be longer compared to other alternatives that rely more on in-river technologies to address contamination. Long-term monitoring and maintenance of engineering controls and surface water would ensure that chemical specific ARARs are being met.

During implementation of this alternative potential short-term exceedances of some water quality criteria are possible. Under state law, OAR 340-048-0015 and OAR 340-041-004, short term degradation is allowable if the benefits of the lowered water quality outweigh the environmental costs of the reduced water quality as determined through an analysis of the specific water quality impacts and the development of a water quality monitoring plan during design. Through the analysis of the activity and in the water quality monitoring plan, EPA needs to determine that the activity will be conducted in a manner which will not violate applicable water quality standards beyond the specified short-term degradation period and contain the conditions determined to be necessary or desirable with respect to the discharge (also see Section 401 and implementing regulations of the Clean Water Act). Compliance with water quality criteria will be met through application of the conditions placed on the discharge as specified in the water quality monitoring plan at a specified distance from the remedial operation. Examples of the types of conditions that will be required are: the use of BMPs, engineering controls and monitoring that will primarily seek to minimize sediment resuspension and dissolved chemical dispersion during dredging and capping activities.

Compliance with Location-Specific ARARs

Location-specific ARARs for the remedy would be addressed during design and implementation of the selected remedy. Key location-specific ARARs include but are not limited to:

- Endangered Species Act (ESA) specified under 16 USC 1536 (a)(2);
- Federal Emergency Management Act regulations specified under 44 CFR 9;
- Essential fish habitat as established under Magnuson-Stevens Fishery Conservation and Management Act, 50 CFR Part.600.920; and
- Presence of archaeologically or historically sensitive areas as established under the Native American Graves Protection and Reparation Act, 25 USC 3001-3013, 43 CFR 10.
- The presence of archaeologically or historically sensitive areas as established under the Indian Graves and Protected Objects ORS 97.740-760.
- National_Historic Preservation Act (NHPA) and Archaeological Objects and Sites

<u>ESA</u>

ESA requires that the remedial action may not jeopardize the continued existence of endangered or threatened species or result in the adverse modification of species' critical habitat. Agencies are to avoid jeopardy or take appropriate mitigation measures to avoid jeopardy. The substantive requirements of this ARAR would be met during design, construction and long-term monitoring of the alternative.

Compliance with ESA would be met through preparation of a Site-wide Biological Assessment (BA). The BA will evaluate the effects to species listed as threatened or endangered under ESA found at the site and those species' designated critical habitat from the proposed remedial activities and how such impacts will be mitigated and reduced. The BA will determine whether the dredging, capping, and other in-river technologies, EMNR, MNR may adversely affect listed species and propose BMPS and other mitigation measures to minimize the impacts to the species and critical habitat during construction of the remedy as well as mitigation that may be necessary to compensate for impacts to critical habitat. Long-term monitoring of the compensatory mitigation to assure it is functioning as designed will be required. The BA will be provided to the Services (National Marine Fisheries Service [NMFS] and U.S. Fish and Wildlife Service [USFWS]) for their coordination and concurrence. As remedial design progresses there likely will be a need to supplement the site-wide BA to address specific issues unique to remedy implementation at a particular area within the site. If remedial activities may result in any take, a take permit will be requested from the Services. The BA will also serve as a resource document for concurrent Essential Fish Habitat (EFH) coordination with NMFS in compliance with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

<u>Federal Emergency Management Act</u>

These regulations at 44 CFR 9 sets forth the policy, procedure and responsibilities to implement and enforce Executive Orders 11988 (Management as Floodplain), as amended by 136090 and 11990 (Protection of Wetland). The substantive requirements of this ARAR would be met during design and implementation of the alternative. In order to comply with Federal Emergency Management Act, the alternative will need to be analyzed and designed to achieve the following issues:

- Minimize the use of remedial process options that result in a net increase of fill material placed within the river and adjoining flood plain.
- Perform detailed modeling to demonstrate that the alternative does not result in unacceptable flood rise.
- The use of natural features and nature-based approaches in the implementation of the alternative.
- Placement of structures at a higher vertical elevation to address current and future flood risks.
- The floodplain and corresponding elevations would be determined using these approaches:
  - Flood Rise: The evaluation of flood rise will need to consider 500-year flood elevation and freeboard and be based on the best-available, actionable hydrologic and hydraulic data and methods that integrate current and future changes in flooding based on climate science.
  - Channel Depth: The Willamette River currently has an authorized channel depth of -40 feet Columbia River Datum (CRD). Prior to listing of the Portland Harbor Superfund Site on the National Priorities List (NPL), the USACE proposed deepening the federally maintained navigation channel to -43 feet CRD. Deepening the navigation channel may mitigate the effects of cap and thick layer sand cover placement on flood rise associated with the sediment cleanup.

- Climate Change: In general, climate change is expected to result in increased winter flow, decreased summer flow and lower snow packs. River flows within the Willamette River watershed are predicted to be higher in the winter, lower in the summer and with an earlier peak flow. In addition, because of a lower snow pack and more frequent fall and winter rain events, more high flow events are expected but of less magnitude than the large flood events observed in the 1900s. Uncertainties associated with potential climate change will be incorporated into the flood rise evaluation.

<u>Native American Protected Objects and Graves Protection Preparation</u>

During the RI, a cultural resource analysis was conducted and it concluded that there are possible archeological artifacts at the site, but no grave site were noted. EPA would meet the substantive requirements of this ARAR during implementation of the alternative in coordination and consultation with the relevant Tribes. If Native American cultural items or grave sites are present on a property, an inventory of such items would be compiled and items would be returned to the Tribes.

If removal of cairn, burial, human remains, funerary objects, or other sacred objects takes place, re-interment will occur under the supervision of the appropriate Indian tribe. Proposed excavation by a professional archaeologist of a Native American cairn or burial requires written notification to the State Historic Preservation Officer and consultation with the appropriate Indian tribe.

<u>National Historic Preservation Act (NHPA) and Archaeological Objects and Sites</u>

The substantive requirements of this ARAR would be met during design and implementation of the alternative. If cultural resources on or eligible for the national register are present, it will be necessary to determine, in consultation with the appropriate State Historic Preservation Office, if there will be an adverse effect to the resource and, if so, how the effect may be minimized or mitigated. The unauthorized removal of archaeological resources from public or Indian lands is prohibited. Any archaeological investigations at a site must be conducted by a professional archaeologist.

Compliance with Action-Specific ARARs

Action-specific ARARs for the remedy would be addressed during implementation. Key action-specific ARARs include but are not limited to:

- Section 404 of the Clean Water Act and the 404(b)(1) guideline regulations;
- Oregon Water Quality Standards (WQS), Clean Water Act Sections 401 and 402;
- Rivers and Harbors Act, Section 10, 33 USC Section 403. 33 CFR Section 322(e), 33 CFR Section 323.3 and Section 323.4(b) and (c);
- Resource Conservation and Recovery Act (RCRA) and implementing regulations;

- Hazardous Waste and Hazardous Materials II. ORS 466.005(7) OAR 340-102-0011 - Hazardous Waste Determination;
- Hazardous Waste and Hazardous Materials II. Identification and Listing of Hazardous Waste OAR 340-101-0033;
- State of Oregon Solid Waste (ORS459.0015, ORS 459.015, and OAR 340-093 through 340-095);
- Toxic Substances Control Act, 15 USC §2601 et seq., 40 CFR Part 761.60-761.79.

<u>CWA 404</u>

The requirements of the CWA Section 404 and 404(b)(1) guidelines apply to selecting in-water disposal sites and evaluating impacts and compensatory mitigation for unavoidable impacts from dredging, covering, capping. The 404(b)(1) guidelines provide standards for the designation, construction and monitoring of in-water disposal sites and in-water filling activities in the Willamette River, and require that no such disposal shall jeopardize the existence of a listed species under the Endangered Species Act. A simplified approach was used for the FS that assumed armored and reactive caps within shallow water areas and riverbanks would result in unavoidable impacts that would require compensatory mitigation. This approach is presented in Appendix H.

The alternative would meet all of the substantive requirements of this ARAR during design, construction, and long-term monitoring. Full compliance with CWA 404(b)(1) includes preparation of a 404(b)(1) evaluation document to determine the potential impacts of the activities performed under this alternative on waters and wetlands, as well as opportunities to mitigate any unavoidable adverse impacts to those aquatic resources. Through the 404(b)(1) analysis, controls will be required for construction activities to minimize the impacts. Even with implementation of avoidance and minimization efforts, it is anticipated that remediation of the Site will result in unavoidable loss of some aquatic habitat. These losses will be offset by compensatory mitigation, which entails the restoration, establishment, enhancement, and/or preservation of wetlands, streams, or other aquatic resources conducted specifically for the purpose of offsetting authorized impacts to these resources. A compensatory mitigation framework will be developed which, in coordination with NMFS and USFWS, may use a Habitat Equivalency Analysis (HEA) method, Relative Habitat Value (RHV) scoring approach, or other approach for determining compensatory mitigation acreages.

The substantive requirements of the CWA Section 404 triggers the need to consider the substantive requirements of the CWA Section 401 and Oregon's Water Quality law. Pertinent water quality-specific information would be considered during design and a water quality monitoring plan will be developed to include conditions on the activities to be met such as, but not limited to, dredging speeds and techniques, establishing a point of compliance for water quality criteria, type and frequency of monitoring samples, storm water management and treatment, erosion control measures, seasonal constraint, and restoration/mitigation measures.

Both CWA Section 401 and Oregon's Water Quality Law require that any activity during the implementation of the remedial action that may result in a discharge to waters of the State requires reasonable assurance that water quality standards will be complied with and requires conditions and other requirements deemed necessary to be placed on the discharge. During dredging and cap placement operations, potential short-term exceedances of some water quality criteria are possible. However, through the application of BMPs and engineering control measures water quality criteria will be met in accordance with Section 401 and Oregon's Water Quality Law.

RCRA

The substantive requirements of the RCRA ARAR would be met during design and implementation of the alternative. Analytical testing results of dredged sediment will be used for waste characterization. Initially this will consist of evaluation of remedial investigation data which will then be supplemented with design-level information. The sediment and soil disposal decision tree (**Figure 3.3-40**) is used to guide the process to determine appropriate disposal. A Materials Management Plan will be developed to provide the necessary ARAR compliance documentation.

All dredged materials and contaminated riverbank materials removed from the Site under this alternative would be managed under Disposal Management Method (DMM) Scenario 2 (off-site disposal facilities).

- Compliance with RCRA hazardous waste identification and handling will be met and will include preparation of a Materials Management Plan during design to be used during implementation of remedial actions. The extent of the area containing listed hazardous waste off of the Siltronic/GASCO facilities will be further refined in design. Characteristic hazardous waste will be identified through Toxicity Characteristic Leaching Procedure (TCLP) sampling as allowed by RCRA. Characteristic hazardous waste criteria for toxicity have been established for 10 COCs in sediment as shown in **Table 4.2-1**. The RI data set indicates that six COCs exceed the criteria. The locations where these criteria are exceeded is presented on **Figure 4.2-1**.
- Waste will also be sampled as generated to determine any volumes that exceed Land Disposal Restrictions (LDRs) and will require the prescribed treatment prior to disposal. LDR values have been established for 39 COCs as shown in **Table 4.2-2**. The RI data set indicates that 32 COCs exceed the criteria. The locations where these criteria are exceeded is presented on **Figure 4.2-2.**
- Hazardous waste generated during remedial actions may be treated and temporarily stored at transload facilities pending final transport and disposition. An on-site transloading facility may be used. No hazardous waste will be

disposed of onsite. The Materials Management Plan will define record keeping requirements, container requirements, storage requirements consistent with RCRA to be implemented during construction and operation of the transload facilities.

Hazardous Materials Transportation Act:

The substantive requirements of this ARAR would be met during design and implementation of the alternative. A Materials Management Plan will be developed during design detailing compliance with hazardous materials transportation regulations.

Oregon Hazardous Waste and Hazardous Materials:

The substantive requirements of this ARAR would be met during design and implementation of the alternative. State-listed hazardous waste has been identified off the Arkema site. Any dredge material generated from this area or any other area where pesticides are located in sediment or riverbank soil will be tested and handled in accordance with Oregon regulations as shown on **Figure 3.3-40**. This approach would also meet the requirements for management of waste pesticides in Oregon Administrative Rule (OAR) 340-109. Hazardous waste generated during remedial actions may be treated and temporarily stored at transload facilities pending final transport and disposition. A Materials Management Plan will be developed as part of design addressing how State treatment and storage regulations will be complied with during the construction and operation of the transload facilities.

Toxic Substances Control Act (TSCA):

The substantive requirements of this ARAR would be met during design and implementation of the alternative. It is anticipated that TSCA waste containing greater than 50 mg/kg of PCBs may be generated as a result of remedial actions in riverbank areas. The Chemical Waste Management Facility in Arlington, Oregon, is permitted to accept TSCA waste (RCRA and TSCA EPA ID Permit ORD089452353). The Materials Management Plan to be prepared during design and utilized during implementation will address proper handling and disposition of any TSCA waste generated during remedial actions. There were no sediment samples that exceeded the TSCA threshold in the RI, so it is anticipated that very little, if any, waste would be generated that would require compliance with this ARAR.

General Emissions Standards and Fugitive Emission Requirements:

The substantive requirements of these ARARs would be met during design and implementation of the alternative. Reasonable precaution to control fugitive emission of air contaminants will be taken in accordance with OAR 340-226. Emission of airborne particulate matter would be controlled to address OAR 340-208. Dust suppression will be maintained to eliminate air contaminant migration during remedial action in compliance with these ARARs.

Marine Mammal Protection Act:

The substantive requirements of this ARAR would be met during design and implementation of the alternative. The selected remedial actions will be carried out in a manner to avoid adversely affecting marine mammals (such as the Steller sea lion).

Migratory Bird Treaty Act (MBTA):

The substantive requirements of this ARAR would be met during design and implementation of the alternative. The selected remedial actions will be carried out in a manner to avoid adversely affecting migratory bird species, including individual birds or their nests (such as the Bald Eagle).

Fish and Wildlife Coordination Act:

The substantive requirements of this ARAR would be met during design and implementation of the alternative. This statute and implementing regulations require coordination with federal and state agencies for federally funded projects to ensure that any modification of any stream or other water body affected by any action authorized or funded by the federal agency provides for adequate protection of fish and wildlife resources.

4.2.2.3 Long-Term Effectiveness and Permanence

Under Alternative B, approximately 462,000 cy of contaminated sediments and riverbank soil covering approximately 81 acres of river bottom and 9,624 lineal feet of riverbank would be permanently removed by dredging or excavating to targeted sediment removal depths. Various caps would be placed over 31 acres of the site. Residuals from dredging and EMNR would be managed with a thin layer sand cover at 103 acres. After construction is completed, the resuspension of contaminated sediments would no longer contaminate surface sediments and biota or pose unacceptable impacts to humans and the environment where construction has occurred.

Magnitude of Residual Risk

The modeled human health residual risk for each alternative at the completion of construction are provided in **Figures 4.1-4, 4.1-5** and **4.1-6**.

The ecological modeled residual risk for each alternative at the completion of construction are provided in **Figures 4.1-7 and 4.1-8.**

Adequacy and Reliability of Controls

Sediment removal, capping, and thin layer covers are reliable and proven technologies as long as they are designed for the appropriate environmental and anthropogenic conditions. Offsite thermal destruction (incineration) and land-based disposal facilities are in operation and have proven to be reliable technologies.

Alternative B would be effective in limiting exposure to risks posed by COCs in the sediments and riverbank soils provided the integrity of the caps is maintained.

Therefore, the caps would need to be monitored and maintained in perpetuity. Reviews at least every five years, as required, would be necessary to evaluate the effectiveness of any of these alternatives because hazardous substances would remain on-site in concentrations above health-based levels.

Operation and maintenance activities, ICs and long-term monitoring will be implemented to assure protectiveness and reliability of caps, residual management layers and EMNR. The following paragraphs further describe how these activities maintain the protectiveness and reliability of these controls:

- O&M will be required for material left in place and may include bathymetric surveys and diver performed monitoring at regular intervals to confirm the thickness of thin layer sand covers and capping materials. In addition to regular surveys, supplemental surveys will be performed following episodic natural) and anthropogenic events that have the potential to disturb caps and sand covers.

- ICs include governmental controls, proprietary controls and informational devices. The reliability of institutional controls ICs can be enhanced through activities such as regular inspection of buoys and other devices to delineate regulated navigation areas, administrative procedures and inspections to ensure the maintenance of co-located structures and ongoing public outreach efforts to enhance the effectiveness of informational devices. The existing OHA fish consumption advisories, which rely on voluntary compliance, would be enhanced by additional outreach to improve their effectiveness in reducing risk to human health by limiting exposure to COCs. Additional institutional controls (see Table 2.4-2) would be necessary to maintain cap integrity in perpetuity.

- MNR includes monitoring of the water column, sediment, and biota tissue before, during and after construction to verify that risks to the ecosystem continue to decrease. The planned post-construction monitoring program would result in collection of the data necessary to determine whether the fish consumption advisory or other restrictions imposed as part of the remedial action could be relaxed. Tissue PRGs based on the consumption of 19 eight-ounce fish meals per month were developed for use during the post-construction monitoring period to evaluate if contaminant concentrations are decreasing toward PRGs as expected.

4.2.2.4 Reduction in Toxicity, Mobility and Volume through Treatment

Implementation of Alternative B reduces toxicity, mobility and volume through treating sediments and riverbanks where PTW is present or where groundwater plumes are discharging or have the potential to discharge into the sediment and surface water. PTW will be treated in-situ or ex-situ, depending on the technology assignment, while in-situ treatment will be used in areas where groundwater plumes are located.

Treatment Processes Used

Activated carbon or organophilic clay are the representative in-situ treatment technologies that reduce the bioavailable fractions of contaminants as measured through pore water concentrations. The delivery mechanisms for activated carbon or organophilic clay include:

- *Broadcast Activated Carbon:* Direct broadcasting of activated carbon onto the sediment surface at 1 pound of carbon per square foot (lb carbon/ft^2)
- *Reactive Caps:* Includes a 12-inch chemical isolation layer comprised of sand mixed with 5 percent activated carbon (0.12 pounds per square foot per centimeter [lbs/ft^2/cm])
- *Reactive Residual Management Cover:* 12 inches of sand mixed with 5 percent activated carbon (0.12 lbs/ft^2/cm)
- *Significantly Augmented Reactive Cap:* Includes a 12-inch chemical isolation layer comprised of sand mixed with 0.48 lbs/ft^2/cm activated carbon and an organoclay layer

PTW that is highly mobile and not reliably contained is identified to be treated ex-situ prior to disposal. All PTW treated ex-situ in this alternative is assumed to be disposed at a RCRA Subtitle C facility. In addition, the Subtitle C disposal facility selected as a representative process option (Chem Waste) uses treatment processes such as cement stabilization or thermal desorption, as needed, to meet LDRs for hazardous waste. Thermal desorption is the representative ex-situ treatment technology.

Amount of Material Destroyed or Treated

Under Alternative B, the amount treated would be:

- *Broadcast Activated Carbon:* 7 acres
- *Reactive Caps:* 21 acres
- *Reactive Residual Management Cover:* 56 acres
- *Significantly Augmented Reactive Cap:* 1.8 acres

In addition, based on the technology assignments for this alternative, the estimated quantity of dredged PTW (source material and not reliably contained) requiring ex-situ treatment is estimated at 161,000 cy.

Reduction of Toxicity, Mobility or Volume

Reduction of toxicity, mobility and volume would be achieved through:

- Capping of 21 acres
- In-situ treatment of 7 acres
- Dredging and off-site disposal of 301,000 cy
- Ex-situ treatment (thermal desorption) of 160,000 cy

The actual amount of material subject to ex-situ treatment would depend on the results of the waste characterization testing during the remedial design. Thermal desorption further reduces the mobility of approximately 39 percent of the dredged material that is PTW. In addition, the mobility of contaminants would be further reduced through sequestration by placing it in a permitted landfill, not due to permanent and irreversible treatment. For dredged material not subject to ex-situ treatment, mobility would be reduced by placing it into a permitted landfill (through sequestration, not treatment); there would be no reduction in toxicity or volume.

Irreversible Treatment

Activated carbon is not readily broken down in the environment and thermodynamic principles indicate that the bonding of COCs to activated carbon will remain strong over time. COCs are expected to remain bound whether the sorbent and bound chemicals remain in the sediment bed or are re-suspended and transported away from the area (ITRC 2014). As a result, use of activated carbon for in-situ treatment is considered permanent and irreversible as long as there is sufficient quantity of activated carbon to address the amount of contamination present.

Low-Temperature Thermal Desorption is an ex-situ remedial technology that uses heat to physically separate organic contaminants from excavated soils and sediments. Thermal desorbers are designed to heat contaminated sediments to temperatures sufficient to cause contaminants to volatilize and desorb (physically separate) from the sediment. Although they are not designed to decompose organic constituents, thermal desorbers can, depending upon the specific organics present and the temperature of the desorber system, cause some of the contaminants to completely or partially decompose. The vaporized hydrocarbons are generally treated in a secondary treatment unit (such as an afterburner, catalytic oxidation chamber, condenser, or carbon adsorption unit) prior to discharge to the atmosphere. Afterburners and oxidizers destroy the organic constituents. Condensers and carbon adsorption units trap organic compounds for subsequent treatment or disposal.

Solidification/Stabilization method chemically reactive formulations that form stable solids that are non-hazardous or less-hazardous than the original materials. Solidification refers to the physical changes in the contaminated material when a certain binding agent is added. These changes include an increase in compressive strength, a decrease in permeability, and condensing of hazardous materials. Stabilization refers to the chemical changes between the stabilizing agent (binding agent) and the hazardous constituent. These changes should include a less soluble, less toxic constituent with hindered mobility. Common bonding agents include, but are not limited to, Portland cement, lime, limestone, fly ash, slag, clay, and gypsum. Because of the vast types of hazardous materials, each agent may be tested/piloted on the site before a full-scale project is undertaken. Most binding agents used are a blend of various single binding agents, depending on the hazardous material. Portland cement has been used to treat more contaminated material than any other solidification/stabilization binding agent because of its ability to bind free liquids, reduce permeability, encapsulate hazardous materials, and reduce the toxicity of certain contaminants. Lime can be used to adjust the pH of the substance of drive off water by the exo-thermic reaction. Limestone can also be used to adjust pH levels.

Type and Quantity of Residuals Remaining After Treatment

Implementation of Alternative B would not address 69 percent of the PTW at the site, consisting primarily of PCBs and dioxins/furans. There would also be residual PTW that will remain under caps, although the treatment barriers in the caps would be designed to prevent exposure. While 9.6 acres of reactive caps are included in this alternative to deal with exposures from contaminated groundwater plumes, the full extent of exposure from these plumes is uncertain and has not been quantified. Based on the upland evaluations on the nature and extent of these groundwater plumes, this alternative would treat the least amount of contaminated groundwater at the site. Additional characterization during remedial design would be required to ensure that the full extent of the exposure is addressed in remedy implementation.

4.2.2.5 Short-Term Effectiveness

With the exception of Alternative A, implementation of Alternative B would have the least impact to the community, workers, and the environment during construction. The period of construction (4 years) is shorter and involves handling of the least amount of dredged materials (462,000 cy) and barrow materials (314,000 cy) than other alternatives. However, Alternative B would require the longest time to achieve RAOs which would mean the longest impacts to the environment. These impacts would include the economic burden of not consuming the fish and ability of the tribes to fully engage in their ceremonial practices.

Community Protection

There are some short-term risks to the community from exposure to contaminated sediments and riverbank soils during the construction period. This alternative involves dredging of 81 acres, with import of approximately 313,930 cy of barrow material. Construction is assumed to proceed 24 hours per day, six days per week, 122 days per year, four years. Construction and operation of a treatment and transport facility may be necessary. Construction and operation activities may result in temporary noise, light, odors, potential air quality impacts and disruptions to commercial and recreational river users on both sides of the river. However, the actual duration at any specific location would be less than the overall construction period.

Off-site disposal may result in upland impacts to the community through increased vehicular traffic (direct transport to off-site disposal or rail transfer facilities) with potential increases in accidents and air-quality issues associated with dust, odor, and vehicular exhaust. Increased barge traffic transporting dredged material may interfere with commercial navigation, increased potential for waterborne accidents, and on-shore impacts from exhaust. Under this alternative, the amount of dredged and borrow materials for construction that require handling and transport is less than for alternatives D through G.

Measures to minimize short-term risks to the community will be addressed through implementation of health and safety plans and the use of BMPs, including the following:

- Limiting access to sediment processing at upland treatment and transfer facility areas to authorized and trained personnel.
- Pollution controls to minimize emissions and odors from construction activities.
- Engineering and navigation controls (established by the dredging and/or materials management contractor working in coordination with the U.S. Coast Guard and other entities) to mitigate increased river traffic.
- Isolating work areas with an adequate buffer zone so that pleasure craft and commercial shipping can safely avoid construction areas.
- Fish consumption advisories would continue under this alternative until such time as Remedial Action Objectives (RAOs) are achieved. COC concentrations in fish tissue are expected to increase during the course of the multi-year construction period; however, this will mainly occur during the in-water work window of July 1 through October 31. Based on experience at other sites (reference sites?), recovery following construction is relatively rapid, on the order of a few years, and are expected to continue to decrease as contaminant concentrations in sediment decrease.

Worker Protection

Alternative B would pose potential risks to site workers through:

- Direct contact with COCs in dredged sediment
- Demolition, removal, and/or replacement of structures
- Activities in a river environment such as working on a vessel, near heavy and mobile equipment in and around working docks
- Working around marine operations with frequent vessel traffic

- Transport of borrow materials and carbon amendment for cover construction
- Placing amendments in in-situ treatment areas
- Transport of contaminated sediment and riverbank soils

Overall, the risks associated with this alternative would be less than for alternatives D though G due to the shorter construction period.

Safety measures and BMPs would be used to minimize the impacts referenced above. Measures such as:

- Use personal protective equipment (PPE)
- Establish work zones
- Dust suppression during material handling and riverbank actions
- Worker Health and Safety Plans
- Following Occupational Safety and Health Administration (OSHA) approved health and safety procedures

Environmental Impacts

Sediment removal may result in short-term adverse impacts to the river, including:

- Exposure of fish and other biota to suspended and dissolved contaminants in the water column.
- Temporary loss of benthos and habitat for the ecological community in dredged areas.
- Increased emissions from construction and transportation equipment.

Measures and BMPs would be used to minimize the above referenced impacts, including:

- Engineering controls to minimize resuspension/release during cap placement.
- Sequencing of dredging and placement activities to minimize recontamination potential.
- Conduct work within the in-water work window (July 1st through October 31st) to minimize impacts on the aquatic environment.

- Silt curtains, sheet pile walls, or other physical barriers will be used as appropriate to minimize releases.
- Actions will be taken to remove fish from within barrier enclosures prior to commencing construction activities.

Precautions and controls will be taken to prevent incidental and accidental discharges of toxic materials from entering the water column from in-water work. These include:

- Use spill plates and aprons to prevent dropping dredge material into the water
- Reduction of cycle times.
- Restrict lateral movement of the dredge bucket while under water.
- Use closed dredge buckets whenever site conditions allow.
- Reduce or stop dredging during periods of peak current.

Application of emissions reduction strategies to reduce short-term impacts posed to the environment and promote technologies and practices that are sustainable according to the EPA Region 10 Clean and Green Policy. Emission reduction could be controlled through BMPs such as:

- Use of reusable energy sources.
- Limit idling of trucks and equipment.
- Rely on local sources of materials.
- Ensuring that trucks, barges and railcars are full prior to transport
- Implement onsite dust and noise control to reduce air pollutant and greenhouse gas emissions.
- Require clean fuel incentives in construction contracts.

Environmental impacts would continue until RAOs are achieved. Environmental impacts to human health via consumption would be controlled through fish consumption advisories.

Time until Action Complete

Construction operations for this alternative are estimated to take four years. Following the estimated construction time, Alternative B would take the longest time to meet RAOs and PRGs because the residual concentrations would be the greatest and the time to dilute those concentrations would take longer. The following provides a discussion of which COCs are met under the RAOs.

RAO 1

This RAO only applies to nearshore areas. COCs include arsenic, PCBs, cPAHs, and TCDD. Under Alternative B, PCBs and TCDD will be met throughout the site. Arsenic will be met in all areas except SDUs 4.5E and 5.5E in the eastern nearshore area and SDUs 3.9W, 7W, and 9W. Carcinogenic PAHs will only be met in Swan Island Lagoon and at SDU 11E.

RAO 2

COCs for this RAO include aldrin, chlordanes, DDx, dieldrin, hexachlorobenzene, PCBs, cPAHs, 1,2,3,4,7,8-HxCDF, 1,2,3,7,8-PeCDD, 2,3,4,7,8-PeCDF, 2,3,7,8-TCDF and 2,3,7,8-TCDD. Under Alternative B, cPAHs will be met throughout the site.

4.2.2.6 Implementability

Alternative B would be readily implementable from both the technical and administrative standpoints. The in-river remedial action as envisioned in this FS can be constructed, operated, and maintained within the site-specific and technology-specific regulations and constraints.

Ability to Construct and Operate

The in-river construction activities required for the implementation of Alternative B would be technically feasible and have been implemented at many Superfund sites around the country. Implementation of Alternative B would involve dredging 462,000 cy of sediment and the handling and placement of 314,000 cy barrow material. These volumes are less than would be required for Alternatives D though G. This alternative also has the shortest project duration for the in-water construction. Alternative B would present the least challenge to implement.

Alternative B has a construction period of approximately four years, involves construction activities within 200 acres, and thus has a low potential for technical difficulties that could lead to schedule delays. Portland Harbor is a working industrial waterway that has the necessary infrastructure to support sediment remediation activities. Nevertheless, careful coordination will be required among government agencies, private entities and the community to design, schedule, and construct the cleanup actions. Further, it will be important to evaluate whether upland source control actions have been implemented to a sufficient degree before or as a part of remedy construction to limit recontamination potential.[3]

Inadequate removal of contaminated sediment or the need to manage residuals remaining after dredging could require further evaluation to determine the need for additional actions. Release and residual management measures such as silt curtains and

[3] If further action under CERCLA is warranted, then a separate decision document would be issued.

sheet piles may be difficult to construct and reliably operate in portions of the river affected by navigation traffic, deeper water, and significant current, this may lead to schedule and implementation delays.

Another technical implementability challenge is remediation under piers and other above-water structures. Debris is expected to complicate, but is not likely to significantly delay, construction efforts. The number of obstructions expected to be encountered during construction of this alternative is the smallest compared to the other alternatives. Maintaining flexibility in construction methods through the remedial design phase is an important consideration for these areas.

Ease of Doing More Action, if Needed

Increasing the extent of capping, dredging/excavation, in-situ treatment, or EMNR would be easily implemented. Additional actions on riverbanks could be more problematic due to factors such as adjacent land use, structures, steepness, use of the adjacent waterways, and community concerns.

Ability to Monitor Effectiveness

Monitoring effectiveness during construction and in the long-term is relatively straightforward and easy to implement. Inspection, maintenance, and replacement of caps are relatively easy and straightforward to implement in unobstructed areas, but may be more challenging around obstructions, in the navigation channel, or in future maintenance dredge areas. If monitoring should fail to detect a release in areas where waste has been left in place in a reasonable time frame, then a release of COCs to the environment may occur. The risk of this occurring is highest for this alternative since it leaves the most waste in place, commensurate with a lower level of protection.

Institutional controls are a component of all remedial alternatives to manage human health risks from consumption of fish and shellfish in the short and long term. The primary control mechanisms are fish consumption advisories, in conjunction with public education and outreach programs to enhance awareness end effectiveness of the advisories as a means to reduce exposures to COCs. In addition, environmental covenants (such as RNAs and land-use restrictions) will be used to protect capped, in-situ treatment, EMNR, and MNR areas where contamination is left in place above levels needed to achieve cleanup objectives. Both controls are difficult to monitor. Environmental covenants are difficult to enforce. Fish consumption advisories are not enforceable and are generally understood to have limited effectiveness. One objective of the public education/outreach effort is to improve compliance with the advisories. Institutional controls should therefore be relied upon only to the minimum extent practicable. These programs would likely be developed and administered by the responsible parties with EPA and OHA oversight and with participation from local governments, Tribes, and other community stakeholders.

MNR requires significant administrative effort over the long term to oversee and coordinate MNR sampling, data evaluation, and future additional actions, if any are needed. Alternative B relies the most on reducing contaminant concentrations through MNR (approximately 2,250 acres) therefore, there is greater uncertainty that RAOs and PRGs will be met in a reasonable timeframe. For this reason, some additional future remedial actions are predicted to be more likely for Alternative B. Should future remedial actions be warranted, subsequent decision documents would be issued.

Ability to Obtain Approvals and Coordinate with Other Agencies

A key administrative feasibility factor for Portland Harbor is that in-water construction is not allowed year round in order to protect migrating salmon in the lower Willamette River. The in-water fish work window established for the Willamette River is July 1 through October 31 accounts for fish migration patterns. These will be confirmed by EPA in consultation with the National Marine Fisheries Service and U.S. Fish and Wildlife Service.

Coordination with Oregon Department of State Lands (DSL) and/or other property owners would need to be conducted to manage waste left in place and implement land use restriction ICs. Additionally, property owners of potential staging areas and transloading facilities would also need to be consulted.

Regulatory and facility approval for offsite permitted disposal facilities as identified on **Figure 3.3-40** should be obtainable in a short-period of time.

Regulatory approval for demolition, removal, and relocation of structures may be challenging, but should be obtainable.

Regulated Navigation Areas (RNAs) would need to be established for all caps outside the federally-regulated navigation channel and future maintenance dredge areas that restrict the following activities within 100 feet of the sediment cap:

- Anchoring, spudding, dredging, laying cable, dragging, trawling, conducting salvage operations, operating commercial vessels of any size, and operating recreational vessels greater than 30 feet in length would be prohibited in the regulated area.

- All vessels transiting or accessing the regulated area should do so at no wake speed or at the minimum speed necessary to maintain steerage.

Availability of Specialists, Equipment and Materials

Services, equipment, and materials are locally or regionally available. Since Alternative B requires the least volume of materials, obtaining materials would be the least difficult. Columbia River dredge material is assumed to be commercially available and would be considered as a source of commercial fill material, if it meets the clean fill requirements specified in the ROD. Different modes of transport (barges, trucks and/or rail) for offsite disposal are available. Use of rail would require infrastructure and more coordination than other modes of transport.

Availability of Technologies

Regional upland landfills are authorized to receive contaminated sediment and have done so on several recent projects in or near Portland Harbor. Upland commercial landfills are identified in Section 3.6.3.2 have capacity relative to the volume of sediment expected to be dredged from the Site for Alternative B. The upland commercial landfills can accept wastes transported by rail, barge, or trucking. Transportation and management of materials would involve identification of sufficient space and proximity to the transportation network to the landfill facility. Several potential sites were identified in the Portland Harbor area for construction of a transload facility for handling material for disposal in an upland commercial landfill.

4.2.2.7 Cost

Other than Alternative A, Alternative B has the lowest cost. Total capital costs for this alternative are $811,048,000, with total construction costs of $795,994,000 over 4 years. Total periodic costs (excluding 5-year reviews) are $341,794,000, and the overall net present value cost is $889,480,000. For this and all alternatives, 5-year review periodic costs are $308,000 per event, totaling $1,848,000 over 30 years. Specific components of the overall costs for Alternative B include:

- Site-wide monitoring periodic costs are estimated at $30,166,000 per event, totaling $301,660,000
- Long-term O&M periodic costs are estimated at $6,381,000 per event
- Disposal costs of 290,921 cy of material at a Subtitle C facility are estimated at $337, $275,987,108 (including treatment). Approximately 478,317 cy are assumed to be disposed of at a Subtitle D facility with an estimated cost of $65,985,802

Additionally, longer term costs associated with maintenance and monitoring of contaminants contained on site have been evaluated and estimated to be $xx over an additional 70 years.

Detailed costs associated with implementing Alternative B are presented in Appendix G, and are summarized in Table CS-B.

4.2.3 Alternative D

4.2.3.1 Overall Protection of Human Health and the Environment

4.2.3.2 Compliance with ARARs

Alternative D would comply with ARARs. Chemical specific ARARs would be met over time through implementation of a combination of in-water remedial technologies. Location-specific ARARs for the remedy would be addressed during design and implementation of the alternative. Action-specific ARARs would meet all of the substantive requirements during design, construction and long-term monitoring of the alternative.

Compliance with Chemical-Specific ARARs

Same as Alternative B, except:

There is less reliance on MNR to achieve these ARARs than Alternative B.

Compliance with Location-Specific ARARs

Same as Alternative B

Compliance with Action-Specific ARARs

Same as Alternative B

4.2.3.3 Long-Term Effectiveness and Permanence

Magnitude of Residual Risk

Adequacy and Reliability of Controls

4.2.3.4 Reduction in Toxicity, Mobility and Volume through Treatment

Implementation of Alternative D reduces toxicity, mobility and volume in the same manner as Alternative B.

Treatment Processes Used

Same as Alternative B.

Amount Destroyed or Treated

Same as Alternative B, except:

- *Broadcast Activated Carbon:* 3.3 acres
- *Reactive Caps:* 18.2 acres

- *Reactive Residual Management Cover:* 91.4 acres
- *Significantly Augmented Reactive Cap:* 2.3 acres

Based on the technology assignments for this alternative, the quantity of PTW (source material and not reliably contained) requiring ex-situ treatment is estimated at 296,292 to 395,056 cy.

Reduction of Toxicity, Mobility or Volume

Same as Alternative B, except:

- Sequestration of 4 acres contaminated sediments under an engineered cap
- In-situ treatment of 3 acres of contaminated sediment
- Permanent removal of 1,172,924 to 1,563,898 cy of contaminated sediments
- Ex-situ treatment of 296,292 to 395,056 cy removed sediments

The actual amount of material subject to ex-situ treatment would depend on the results of the waste characterization testing during the remedial design. Thermal desorption further reduces the mobility of approximately 25 percent of the dredged material that is PTW. In addition, the mobility of contaminants would be further reduced through sequestration by placing it in a permitted landfill, not due to permanent and irreversible treatment. For dredged material not subject to ex-situ treatment, mobility would be reduced by placing it into a permitted landfill (through sequestration, not treatment); there would be no reduction in toxicity or volume.

Irreversible Treatment

Same as Alternative B.

Type and Quantity of Residuals Remaining After Treatment

Same as Alternative B, except:

Implementation of Alternative D would not address 46 percent of the PTW at the site.

4.2.3.5 Short-Term Effectiveness

The period of construction for this alternatives (3 years) is longer than for Alternative B and involves handling of more dredged materials (1,172,924 to 1,563,898 cy) and barrow materials (1,200,123 cy). However, Alternative D would have shorter period of impact to the community and environment until RAOs are met.

Community Protection

Measures to minimize and mitigate the impacts to the community are the same as described for Alternative B. This alternative involves dredging of 152 acres, with import of approximately 1,200,123 cy of barrow material. Dredging is assumed to occur over three years, while placement of caps and materials for EMNR are assumed to require a maximum of 87 days. Construction and operation of a treatment and transport facility may be necessary. Impacts from construction and operation activities would occur for a longer time than for Alternative B.

During the construction period, COC concentrations in fish tissue are expected to increase and remain elevated for a longer period of time than for Alternative B. However, this will occur primarily during the work window of July 1 through October 31.

Worker Protection

Measures to minimize and mitigate the impacts to workers are the same as described for Alternative B. Potential risks to site workers during the construction period would occur for a longer period of time for than for Alternative B.

Environmental Impacts

Measures to minimize and mitigate the impacts to the environment are the same as described for Alternative B, although short-term adverse impacts to the river and environment during construction would occur for a longer of time than for Alternative B.

Time until Action Complete

Alternative D is anticipated to take approximately three years to construct. Following the estimated construction duration, RAOs would be achieved in approximately XX years.

4.2.3.6 Implementability

Alternative D would be readily implementable from both the technical and administrative standpoints. The in-river remedial action as envisioned in this FS can be constructed, operated, and maintained within the site-specific and technology-specific regulations and constraints.

Ability to Construct and Operate

Implementation of Alternative D would involve dredging 1,172,924 to 1,563,898 cy and handling and placement of 1,200,123 cy of barrow material. These volumes are less than would be required for Alternative B, but greater than required for Alternatives E though G. Given the volume of material and project duration for the in-water construction, Alternative D would present a slightly greater challenge to implement than Alternative B, but would be easier to construct than Alternatives E, F or G.

Alternative D has a construction period of approximately three years, involves construction activities within 265 acres, and thus has a low potential for technical difficulties that could lead to schedule delays.

Ease of Doing More Action, if Needed

Same as Alternative B.

Ability to Monitor Effectiveness

Alternative D relies more on reducing contaminant concentrations through MNR (approximately 2,185 acres) than Alternatives E, F or G. For this reason, additional future remedial actions are predicted to be more likely based on anticipated difficulties in achieving all cleanup objectives.

If monitoring should fail to detect a release in areas where waste has been left in place (caps, EMNR) in a reasonable time frame, then release of COCs to the environment may occur. The risk of this occurring is lower than for Alternative B, but greater than Alternatives E, F and G since more waste is left in place, with a commensurate lower level of protection.

Ability to Obtain Approvals and Coordinate with Other Agencies

Same as Alternative B.

Availability of Specialists, Equipment and Materials

Alternative D requires the more volume of materials than Alternative B, but less than Alternatives E, F or G; thus, obtaining materials under this alternative would not be difficult.

Availability of Technologies

Same as Alternative B.

4.2.4 Alternative E

4.2.4.1 Overall Protection of Human Health and the Environment

4.2.4.2 Compliance with ARARs

Alternative E would comply with ARARs. Chemical specific ARARs would be met over time through implementation of a combination of in-water remedial technologies. Location-specific ARARs for the remedy would be addressed during design and implementation of the alternative. Action-specific ARARs would meet all of the substantive requirements during design, construction, and long-term of the alternative. This alternative includes the potential use of a CDF which invokes particular ARAR issues discussed below.

Compliance with Chemical-Specific ARARs

Same as alternative B, except:

There is less reliance on MNR to achieve these ARARs than Alternative D.

The point of compliance for chemical specific ARARs would be at the point of discharge to the water column, within the porewater of the CDF berm.

Compliance with Location-Specific ARARs

Same as Alternative B, except:

Federal Emergency Management Act

Compliance with Action-Specific ARARs

Same as Alternative B, except:

CWA 404 and ESA

The siting, design, and operation of the CDF has been analyzed under the factors specified in the CWA 404(b)(1) guidelines (see 404(b)(1) analysis in the administrative record) such that determination that a CDF can be sited and operated as part of the remedial action in compliance with the CWA. CWA 404(b)(1) requirements including coordination with ESA agencies on mitigation measures to avoid jeopardy will be further analyzed and determined as the final design and final determination compensatory mitigation is made. Long-term maintenance and monitoring of the CDF and necessary compensatory mitigation will comply with the CWA and ESA requirements.

RCRA

All dredged materials and contaminated riverbank materials removed from the Site under Alternative E could be managed under DMM Scenario 1 (onsite CDF/off-site disposal facility) or DMM Scenario 2 (off-site disposal facilities). The Sediment Disposal Decision Tree presented in **Figure 3.6-8** is used to guide the process to determine appropriate disposal options for this material. Although dredge sediment management of the CDF are exempt from regulation as a RCRA hazardous waste, Portland Harbor-specific CDF performance standards do not allow contamination that would meet the definition of a listed or characteristic hazardous waste to be disposed in the CDF. Thus, dredge contaminated sediments having toxicity characteristics will be transported off-site for disposal as shown on the Sediment Disposal Decision Tree.

Oregon Hazardous Waste Regulations

State-listed hazardous waste has been identified off the Arkema site and any dredge material generated from this area will be tested and handled in accordance with Oregon regulations and as shown on Sediment Disposal Decision Tree presented in

Figure 3.6-8. This approach would also meet the requirements for management of waste pesticides in OAR 340-109.

<u>Oregon Solid Waste Regulations (relevant provisions of OAR 340-095 for non-municipal landfill regulations):</u>
The CDF will be constructed, filled, maintained and monitored consistent with identified Oregon solid waste regulations for non-municipal landfills.

4.2.4.3 Long-Term Effectiveness and Permanence

Magnitude of Residual Risk

Adequacy and Reliability of Controls

4.2.4.4 Reduction in Toxicity, Mobility and Volume through Treatment

Implementation of Alternative E reduces toxicity, mobility and volume in the same manner as Alternative B.

Treatment Processes Used

Same as Alternative B.

Amount Destroyed or Treated

Same as Alternative B, except:

- *Broadcast Activated Carbon:* 0.3 acres
- *Reactive Caps:* 29 acres
- *Reactive Residual Management Cover:* 154.7 acres
- *Significantly Augmented Reactive Cap:* 3.02 acres

Based on the technology assignments for this alternative, the quantity of PTW (source material and not reliably contained) requiring ex-situ treatment is estimated at 323,672 to 431,563 cy.

Reduction of Toxicity, Mobility or Volume

Same as Alternative B, except:

- Sequestration of 4.8 acres contaminated sediments under an engineered cap
- In-situ treatment of 0 acres of contaminated sediment
- Permanent removal of 2,061,390 to 2,748,520 cy of contaminated sediments
- Ex-situ treatment of 323,672 to 431,563 cy removed sediments

The actual amount of material subject to ex-situ treatment would depend on the results of the waste characterization testing during the remedial design. Thermal desorption further reduces the mobility of approximately 16 percent of the dredged material that is PTW. In addition, the mobility of contaminants would be further reduced through sequestration by placing it in a permitted landfill, not due to permanent and irreversible treatment. For dredged material not subject to ex-situ treatment, mobility would be reduced by placing it into a permitted landfill (through sequestration, not treatment); there would be no reduction in toxicity or volume.

Irreversible Treatment

Same as Alternative B.

Type and Quantity of Residuals Remaining After Treatment

Same as Alternative B, except:

Implementation of Alternative E would not address 3 percent of the PTW at the site.

4.2.4.5 Short-Term Effectiveness

Implementation of Alternative E would require a construction period approximately 5 years longer than required for Alternatives B and D and involves handling of more dredged materials (2,061,390 to 2,748,520 cy) and barrow materials (1,898,210 cy). However, Alternative E would have a shorter period of impact to the community and environment until RAOs are met.

Community Protection

Measures to minimize and mitigate the impacts to the community are the same as described for Alternative D. This alternative involves dredging of 236 acres, with import of approximately 1,898,210 cy of barrow material. Dredging is assumed to occur over a period of 4 to 5 years, while placement of caps and materials for EMNR are assumed to require a maximum of 105 days. Construction and operation of a treatment and transport facility and CDF may be necessary. Impacts from construction and operation activities is longer than for Alternatives B and D. Additional impacts during filling of the CDF would be minimized by monitoring air quality and water quality and through implementation of BMPs.

During the construction period, COC concentrations in fish tissue are expected to increase and remain elevated for a longer period of time than for Alternatives B and D. However, this would occur primarily during the in-water work window of July 1 through October 31.

Worker Protection

Measures to minimize and mitigate the impacts to workers are the same as described for Alternative B. Potential risks to site workers during the construction period for Alternative E would occur for a longer period of time than Alternatives B and D.

Environmental Impacts

Measures to minimize and mitigate the impacts to the environment are the same as described for Alternative B. Short-term adverse impacts to the river during construction would occur for a longer time period than Alternatives B and D. Environmental impacts until RAOs are achieved would occur over a shorter period of time than for Alternatives B and D.

Time until Action Complete

Alternative E is estimated to require approximately 5 years to construct and implement. Following the complete of construction, modeling indicates that RAOs would be achieved in approximately XX years.

4.2.4.6 Implementability

Alternative E would be readily implementable from both the technical and administrative standpoints. The in-river remedial action as envisioned in this FS can be constructed, operated, and maintained within the site-specific and technology-specific regulations and constraints. However, the technical and administrative implementability of the DMM Scenarios vary.

Ability to Construct and Operate

Implementation of Alternative E would involve dredging 2,061,390 to 2,748,520 cy sediment and the handling and placement of 1,898,210 cy barrow material. These volumes are less than would be required for Alternatives B and D, but greater than required for Alternatives F and G. This alternative also has the shortest project duration for the in-water construction. Given the moderate volume of material and project duration for the in-water construction, Alternative E would present a greater challenge to implement than Alternatives B and D, but less challenge than F or G. Alternative E also assumes construction of a CDF, which pose greater technical and administrative challenges than Alternatives B and D. Since construction of the CDF is also assumed for Alternatives F and G, implementability of this component of the alternative is assumed to be the same for Alternatives E through G.

Alternative E has a construction period of approximately five years, involves construction activities within 329 acres, and thus has a greater potential for technical difficulties that could lead to schedule delays than Alternatives B and D, bus less than with F or G.

Ease of Doing More Action, if Needed

Same as Alternative B.

Ability to Monitor Effectiveness

Alternative E relies on reducing contaminant concentrations through MNR (approximately 2,121 acres). For this reason, additional future remedial actions are predicted to be more likely than for Alternatives F and G based on anticipated difficulties in achieving all cleanup objectives.

If monitoring should fail to detect a release in areas where waste has been left in place (caps, EMNR or areas) in a reasonable time frame, then a release of COCs to the environment may occur. The risk of this occurring is lower than with Alternatives B and D, but greater than with Alternatives F and G since more waste is left in place, with a commensurate lower level of protection.

Construction of the CDF would impose greater monitoring requirements for this alternative relative to Alternatives B and D, but essentially the same requirements as required for Alternatives F and G.

Ability to Obtain Approvals and Coordinate with Other Agencies

Same as Alternative B.

Availability of Specialists, Equipment and Materials

Same as Alternative B, except:

Since Alternative E requires the more volume of materials than Alternatives B or D, obtaining materials under this alternative would be the more difficult than those alternatives, but less than Alternatives F or G.

Availability of Technologies

Same as Alternative B, except:

Under DMM Scenario 1 670,000 cy dredged materials would be barged to the Terminal 4 CDF site, minimizing on-land impacts to the community, but increasing vessel traffic in the river. Since major container terminals are located in the Willamette River near the assumed CDF site, increased barge traffic to and from the CDF site may interfere with existing commercial port traffic and increase the potential for waterborne commerce accidents. These risks can be managed through engineering and navigation controls established by the dredging and/or materials management contractor working in association with the Port Authority and other regulatory agencies, to control traffic in and around the CDF site.

4.2.5 Alternative F

4.2.5.1 Overall Protection of Human Health and the Environment

4.2.5.2 Compliance with ARARs

Alternative F would comply with ARARs. Chemical specific ARARs would be met over time through implementation of a combination of in-water remedial technologies. Location-specific ARARs for the remedy would be addressed during design and implementation of the alternative. Action-specific ARARs would meet all of the substantive requirements during design, construction, and long-term monitoring of the alternative.

Compliance with Chemical-Specific ARARs

Same as Alternative E, except:

There is less reliance on MNR to achieve these ARARs than Alternative E.

Compliance with Location-Specific ARARs

Same as Alternative E

Compliance with Action-Specific ARARs

Same as Alternative E

4.2.5.3 Long-Term Effectiveness and Permanence

Magnitude of Residual Risk

Adequacy and Reliability of Controls

4.2.5.4 Reduction in Toxicity, Mobility and Volume through Treatment

Implementation of Alternative F reduces toxicity, mobility and volume in the same manner as Alternative B.

Treatment Processes Used

Same as Alternative B.

Amount Destroyed or Treated

Same as Alternative B, except:

- *Broadcast Activated Carbon:* 0.03 acres
- *Reactive Caps:* 52.4 acres
- *Reactive Residual Management Cover:* 165.8 acres
- *Significantly Augmented Reactive Cap:* 3.6 acres

Based on the technology assignments for this alternative, the quantity of PTW (source material and not reliably contained) requiring ex-situ treatment is estimated at 371,873 to 495,831 cy.

Reduction of Toxicity, Mobility or Volume

Same as Alternative B, except:

- Sequestration of 13 acres contaminated sediments under an engineered cap
- In-situ treatment of 0 acres of contaminated sediment
- Permanent removal of 4,382,536 to 5,843,381 cy of contaminated sediments
- Ex-situ treatment of 371,873 to 495,831 cy removed highly mobile contaminated sediments

The actual amount of material subject to ex-situ treatment would depend on the results of the waste characterization testing during the remedial design. Thermal desorption further reduces the mobility of approximately 8 percent of the dredged material that is PTW. In addition, the mobility of contaminants would be further reduced through sequestration by placing it in a permitted landfill, not due to permanent and irreversible treatment. For dredged material not subject to ex-situ treatment, mobility would be reduced by placing it into a permitted landfill (through sequestration, not treatment); there would be no reduction in toxicity or volume.

Irreversible Treatment

Same as Alternative B.

Type and Quantity of Residuals Remaining After Treatment

Same as Alternative B, except:

Implementation of Alternative F would not address 1 percent of the PTW at the site.

4.2.5.5 Short-Term Effectiveness

The period of construction for Alternative F (12 years) is longer than for Alternatives B, D and E and involves handling of more dredged materials (4,382,536 to 5,843,381 cy) and barrow materials (3,879,518 cy). However, Alternative F would have shorter period of impact to the community and environment until RAOs are met.

Community Protection

Measures to minimize and mitigate the impacts to the community are the same as described for Alternative E. This alternative involves dredging of 424 acres, with import of approximately 3,879,518 cy of barrow material. Dredging is assumed to occur over a period of 10 years, while placement of caps and materials for EMNR are assumed to require a maximum of one and one-half years. Construction and operation of a treatment and transport facility and CDF may be necessary. Impacts from construction and operation activities would occur over a longer period of time than with Alternatives B, D and E. Additional impacts during filling of the CDF would be minimized by monitoring air quality and water quality and through implementation of BMPs.

During the construction period, COC concentrations in fish tissue are expected to increase and remain elevated for a longer period of time than for Alternatives B, D and E. However, this would occur primarily during the in-water work window of July 1 through October 31.

Worker Protection

Measures to minimize and mitigate the impacts to workers are the same as described for Alternative B. Potential risks to site workers during the construction period for Alternative F would occur over a longer period of time than with Alternatives B, D and E.

Environmental Impacts

Measures to minimize and mitigate the impacts to the environment are the same as described for Alternative B. Short-term adverse impacts to the river during construction would occur over a longer period of time than for Alternatives B and D. Environmental impacts until RAOs are achieved would occur over a shorter period of time than for Alternatives B, D, and E.

Time until Action Complete

Alternative F is estimated to require approximately 12 years to construct and implement. Following the complete of construction, modeling indicates that RAOs would be achieved in approximately XX years.

4.2.5.6 Implementability

For Alternative F, the remedial work in the Site would be readily implementable from both the technical and administrative standpoints. The in-river remedial action as envisioned in this FS can be constructed, operated, and maintained within the site-specific and technology-specific regulations and constraints. However, the technical and administrative implementability of the DMM Scenarios vary.

Ability to Construct and Operate

Same as Alternative B, except:

Implementation of Alternative F would involve dredging 4,382,536 to 5,843,381 cy of Sediment and the handling and placement of 3,879,518 cy barrow material. These volumes are greater than would be required for Alternatives B though E, but less than required for Alternative G. This alternative also has the shortest project duration for the in-water construction. Given the greater volume of material and project duration for the in-water construction, Alternative F would present a greater challenge to implement than Alternatives B, D and E, but less challenge than G. Alternative F also assumes construction of a CDF, which pose greater technical and administrative challenges than Alternatives B and D. Since construction of the CDF is also assumed for Alternatives E and G, implementability of this component of the alternative is assumed to be the same as for those alternatives.

Alternative F has a construction period of approximately 12 years, involves construction activities within 538 acres, and thus has a greater potential for technical difficulties that could lead to schedule delays than Alternatives B, D and E, bus less than G.

Ease of Doing More Action, if Needed

Same as Alternative B.

Ability to Monitor Effectiveness

Same as Alternative B, except:

Alternative F relies on reducing contaminant concentrations through MNR (approximately 1,913 acres). For this reason, additional future remedial actions are predicted to be more likely than for Alternative G based on anticipated difficulties in achieving all cleanup objectives.

If monitoring should fail to detect a release in areas where waste has been left in place (caps, EMNR) in a reasonable time frame then a release of COCs to the environment may occur. The risk of this occurring is lower than for Alternatives B, D or E, but greater than with Alternative G since more waste is left in place, with a commensurate lower level of protection.

Construction of the CDF would impose greater monitoring requirements for this alternative relative to Alternatives B and D, but essentially the same as required for alternatives E and G.

Ability to Obtain Approvals and Coordinate with Other Agencies

Same as Alternative B.

Availability of Specialists, Equipment and Materials

Same as Alternative B, except:

Alternative F requires the more volume of materials than Alternatives B, D or E; thus, obtaining materials under this alternative would be the more difficult than those alternatives, but less than Alternatives G.

Availability of Technologies

Same as Alternative E.

4.2.6 Alternative G

4.2.6.1 Overall Protection of Human Health and the Environment

4.2.6.2 Compliance with ARARs

Alternative G would comply with ARARs. Chemical specific ARARs would be met over time through implementation of a combination of in-water remedial technologies. Location-specific ARARs for the remedy would be addressed during design and implementation of the alternative. Action-specific ARARs would meet all of the substantive requirements during design, construction, and long-term monitoring of the alternative.

Compliance with Chemical-Specific ARARs

Same as Alternative E, except:

There is less reliance on MNR to achieve these ARARs than Alternative F.

Compliance with Location-Specific ARARs

Same as Alternative E

Compliance with Action-Specific ARARs

Same as Alternative E

4.2.6.3 Long-Term Effectiveness and Permanence

Magnitude of Residual Risk

Adequacy and Reliability of Controls

4.2.6.4 Reduction in Toxicity, Mobility and Volume through Treatment

Implementation of Alternative G reduces toxicity, mobility and volume in the same manner as Alternative B.

Treatment Processes Used

Same as Alternative B.

Amount Destroyed or Treated

Same as Alternative B, except:

- *Broadcast Activated Carbon:* 0 acres
- *Reactive Caps:* 67.1 acres
- *Reactive Residual Management Cover:* 187.9 acres
- *Significantly Augmented Reactive Cap:* 3.8 acres

Based on the technology assignments for this alternative, the quantity of PTW (source material and not reliably contained) requiring ex-situ treatment is estimated at 388,509 to 518,012 cy.

Reduction of Toxicity, Mobility or Volume

Same as Alternative B, except:

- Sequestration of 24 million acres contaminated sediments under an engineered cap
- In-situ treatment of 0 acres of contaminated sediment
- Permanent removal of 6,865,247 to 9,153,663 million cy of contaminated sediments
- Ex-situ treatment of 388,509 to 518,012 cy removed sediments

The actual amount of material subject to ex-situ treatment would depend on the results of the waste characterization testing during the remedial design. Thermal desorption further reduces the mobility of approximately 6 percent of the dredged material that is PTW. In addition, the mobility of contaminants would be further reduced through sequestration by placing it in a permitted landfill, not due to permanent and irreversible treatment. For dredged material not subject to ex-situ treatment, mobility would be reduced by placing it into a permitted landfill (through sequestration, not treatment); there would be no reduction in toxicity or volume.

Irreversible Treatment

Same as Alternative B.

Type and Quantity of Residuals Remaining After Treatment

Same as Alternative B, except:

Implementation of Alternative G would not address 1 percent of the PTW at the site.

4.2.6.5 Short-Term Effectiveness

The period of construction for Alternative G (19 years) is longest and involves handling of the most dredged materials (6,865,247 to 9,153,663 cy) and barrow materials (6,087,748 cy). However, Alternative G would have shorter overall period of impact to the community and environment until RAOs are met.

Community Protection

Measures to minimize and mitigate the impacts to the community are the same as described for Alternative B. This alternative involves dredging of 759 acres, with import of approximately 6,087,748 cy of barrow material. Dredging is assumed to proceed XX years, while placement of caps and materials for EMNR are assumed to require a maximum of XX days. Construction and operation of a treatment and transport facility and CDF may be necessary. Impacts from construction and operation activities is longer than associated with Alternative B, D, E, and F. Additional impacts during filling of the CDF would be minimized by monitoring air quality and water quality and through implementation of BMPs.

During the construction period, COC concentrations in fish tissue are expected to increase and remain elevated for a longer period of time than for Alternatives B, D, E, and F. However, this would occur primarily during the in-water work window of July 1 through October 1.

Workers Protection

Measures to minimize and mitigate the impacts to workers are the same as described for Alternative B. Potential risks to site workers during the construction period for Alternative E would occur for a longer period of time than for Alternatives B, D, E, and G.

Environmental Impacts

Measures to minimize and mitigate the impacts to the environment are the same as described for Alternative B. Short-term adverse impacts to the river during construction would be longer than Alternatives B, D, E, and F. Environmental impacts until RAOs are achieved would occur over a shorter period of time than for Alternatives B, D, E, and F.

Time until Action Complete

Alternative E is estimated to require approximately 19 years to construct and implement. Following the complete of construction, modeling indicates that RAOs would be achieved in approximately XX years.

4.2.6.6 Implementability

The remedial work for Alternative G would be readily implementable from both the technical and administrative standpoints. The in-river remedial action as envisioned in this FS can be constructed, operated, and maintained within the site-specific and technology-specific regulations and constraints. However, the technical and administrative implementability of the DMM Scenarios vary.

Ability to Construct and Operate

Same as Alternative B, except:

Implementation of Alternative G would involve dredging 6,865,247 to 9,153,663 cy of material and handling and placement of 6,087,748 cy barrow material. These volumes are greater than would be required for Alternatives E though F. and this alternative also has the shortest project duration for the in-water construction. Given the greater volume of material and project duration for the in-water construction, Alternative G would present the greatest challenge to implement. Alternative G also assumes construction of a CDF, which pose greater technical and administrative challenges than Alternatives B and D. Since construction of the CDF is also assumed for Alternatives E and F, implementability of this component of the alternative is assumed to be the same as for those alternatives.

Alternative G has a construction period of approximately 19 years, involves construction activities within 795 acres, and thus has the greatest potential for technical difficulties that could lead to schedule delays.

Ease of Doing More Action, if Needed

Same as Alternative B.

Ability to Monitor Effectiveness

Same as Alternative B, except:

Alternative G relies on reducing contaminant concentrations through MNR (approximately 1,655 acres). For this reason, some additional future remedial actions are predicted to be likely for Alternative G based on monitoring data indicating inadequate performance in achieving all cleanup objectives.

If monitoring should fail to detect a release in areas where waste has been left in place (caps, EMNR) in a reasonable time frame, then release of COCs to the environment may occur. The risk of this occurring is lower than Alternatives B through E since less waste is left in place, with a commensurate higher level of protection.

Construction of the CDF would impose greater monitoring requirements for this alternative relative to Alternatives B and D, but essentially the same as required for Alternatives E and F.

Ability to Obtain Approvals and Coordinate with Other Agencies

Same as Alternative B.

Availability of Specialists, Equipment and Materials

Same as Alternative B, except:

Alternative G requires the most volume of materials; thus, obtaining materials under this alternative would be the most difficult.

Availability of Technologies

Same as Alternative E.

4.3 COMPARATIVE ANALYSIS

4.3.1 Overall Protection of Human Health and the Environment

4.3.2 Compliance with ARARs

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides a basis for a invoking waiver.

All alternatives, except the no action alternative, will attain their respective Federal and State ARARs. Alternatives B through G had common ARARs associated with the construction of the alternative since they are all essentially the same alternative with varying degrees of the technologies applied.

4.3.3 Long-Term Effectiveness and Permanence

4.3.4 Reduction in Toxicity, Mobility and Volume through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternative A does not include treatment as a component of the remedy. Therefore, this alternative would not reduce the toxicity, mobility or volume of contamination at the site.

Alternatives B through G includes in-situ and ex-situ treatment technologies. PTW and groundwater contamination is addressed through treatment for Alternatives B through G and as a result, the preference for treatment as a principle element of the remedial action is met for all alternatives. Reduction in mobility of other contaminants would be through removal and sequestration in a permitted landfill or CDF, or sequestration under in-situ caps. However, there would be no reduction of toxicity or volume through permanent or irreversible treatment. Reduction of the mobility and volume contaminants in groundwater entering the river would be through reactive caps where the reactive layer would isolate the contaminants. In general, the reduction of toxicity, mobility, and volume increases in direct proportion to the construction acreage, where Alternative B would provide the least reduction and Alternative G would provide the most reduction. As the construction acreage increases with each alternative, the reduction of toxicity, mobility, and volume increases as well.

Ex-situ treatment of PTW in contaminated sediments and riverbank soils is determined by the action-specific ARARs, such as LDRs. All PTW treated ex-situ in Alternatives B through G is assumed to be disposed at a RCRA Subtitle C facility. The specific methods of treatment and associated treatment target levels of contaminants will be determined by the facility based on requirements of action-specific ARARs, such as identification of hazardous waste and compliance with LDRs under RCRA. The Subtitle C disposal facility selected as a representative process option (Chem Waste) uses treatment processes such as cement stabilization or thermal desorption, as needed, to meet LDRs for hazardous waste. The toxicity, mobility, and volume of the COCs undergoing thermal treatment would be reduced by more than 99 percent. Solidification/ stabilization would further reduce the mobility of the remaining contaminants. The actual amount of material subject to ex-situ treatment would depend on the results of waste characterization testing during the design phase. In addition, the mobility of contaminants would be further reduced by placing it in a permitted landfill (through sequestration in a landfill cell), although it is not due to permanent and irreversible treatment.

4.3.5 Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternative A would not be an effective alternative because current risks to human health and the environment would continue to exist. However, there are no construction activities planned for Alternative A; thus, there are no risks to the community or workers from construction activities for Alternative A. Risks to the community and environment would continue as a result of exposures to the contaminated media. Fish consumption advisories issued by OHA would continue under Alternative A.

Implementation of Alternative B would have the least impact to the community, workers, and the environment during construction while Alternative G would have the longest impact. However, Alternative B would have the longest impact to the community and environment until RAOs are met, while Alternative G would have the shortest impact. There is some risk of short-term impacts to the community of exposure to from contaminated sediments and riverbank materials during the construction periods for all alternatives. Construction and on-site disposal of a CDF would also impose short-term impacts to the community. Additional impacts during filling of the CDF would be minimized by monitoring air quality and water quality and through implementation of BMPs. Off-site disposal may result in on-land impacts to the community through increased vehicular traffic (through direct transport to off-site disposal facilities or to rail transfer facilities) with an increased accident risk and air-quality issues associated with dust, odor, and vehicular exhaust. Measures to minimize short-term risks to the community will be addressed through implementation of health and safety plans and the use of BMPs. Elevated fish tissue concentrations during construction would be shorter for Alternative B and longest for Alternative G. Fish consumption advisories would continue under each alternative until such time as Remedial Action Objectives (RAOs) are achieved.

There would be potential risks to construction workers during construction activities in Alternatives B through G. However, measures such as air monitoring on-site and at the site boundary, and engineering controls would control the potential for exposure. Risks to workers would be the least in Alternative B, increasing through Alternative G. Workers would be required to wear appropriate levels of protection to avoid exposure during excavation and treatment activities.

Environmental risks during construction would be shortest for Alternative B and increasing through Alternative G. Short-term risks to the environment could include increased emissions from construction equipment and transportation methods for transport of dredged material and imported barrow for caps and residual layers. Short-term risks would be controlled through BMPs, engineering control measures, restricting in-water work time frames (July 1st through October 31st). Appropriate precautions and controls will be used to prevent incidental and accidental discharges of toxic materials from entering the water column as a result of in-water work. The application of emissions reduction strategies during implementation of this alternative can reduce short-term impacts posed to the environment and promote technologies and practices that are sustainable according to the EPA Region 10 Clean and Green Policy. Environmental impacts would continue until RAOs are achieved. Impacts would be longer for Alternative B and decreasing through Alternative G. Environmental impacts to human health via consumption would be controlled through fish consumption advisories.

Alternative B has the shortest construction period and the longest time until the action complete. The construction period increases with each alternative while the time to achieve RAOs decreases.

4.3.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

There are no implementability issues with Alternative A. A ROD amendment may be required in the future if further actions under CERLA are required. Since there is no monitoring required under Alternative A, failure to detect contamination means a potential for consuming contaminated fish and shellfish as well as exposures to other media.

The in-river construction activities required for the implementation of Alternative B through G would be technically feasible and have been implemented at many Superfund sites around the country. Materials, services and equipment necessary for construction are readily commercially available.

In general, the potential for technical problems and schedule delays increases in direct proportion to the duration, and amount of active remediation. As the construction acreage increases with each alternative, the construction period, required administrative coordination, and the potential for technical problems leading to schedule delays increases. The site logistics of implementation also increases in difficulty as more construction acreage is added in each alternative.

Conversely, alternatives with the smallest acreage of construction have a greater potential for triggering additional actions if monitoring data indicates inadequate performance in achieving all cleanup objectives. The risk of monitoring failing to detect a release in areas where waste has been left in place (caps, EMNR or areas) in a reasonable time frame then release of contaminants of concern (COCs) may occur to the environment is indirectly proportional to the acreage.

Installation of the treatment, storage and transfer facility would require permission from the landowner and coordination with local authorities for the construction of utilities within existing right-of-ways.

The CDF component of DMM Scenario 1 in Alternatives E, F and G would be administratively challenging from the standpoint of using, and maintaining a CDF facility. Construction of a CDF increases the relative amount of construction for Alternatives E, F and G, and will require sequencing remedial projects for effective CDF use; potential disruption of navigation and other waterway uses throughout construction, filling, and closure; and obtaining agreements among multiple parties for CDF use; costs; maintenance; and liability.

REFERENCES

Ghosh, et al. 2011. In-situ Sorbent Amendments: A New Direction in Contaminated Sediment Management. Environ. Sci. Technol. 2011, 45, 1163–1168.

ITRC (Interstate Technology & Regulatory Council). 2014. Contaminated Sediments Remediation: Remedy Selection for Contaminated Sediments (CS-2). Washington, D.C.: Interstate Technology & Regulatory Council, Contaminated SedimentsTeam. http://www.itrcweb.org/contseds_remedy-selection.

Tomaszewski, et al. 2008. Measuring and Modeling Reduction of DDT Availability to the Water Column and Mussels Following Activated Carbon Amendment of Contaminated Sediment. Water Research 42 (2008) 4348-4356.

U.S. Environmental Protection Agency (USEPA). 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA. EPA-540-G-89-004.

USEPA. 2000. A Guide to Developing and Documenting Cost Estimates During the Feasibility Study. EPA 540-R-00-002. July 2000.

Zimmerman, et al. 2005. Effects of Dose and Particle Size on Activated Carbon Treatment to Sequester Polychlorinated Biphenyls and Polycyclic Aromatic Hydrocarbons in Marine Sediments. Environ. Toxicol. Chem. Vol. 24, No. 7, 1594-1601.

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Ammon, Doug
Sent: Thur 7/30/2015 9:35:56 PM
Subject: Three things

Robin,

I need three things.

1. Your evaluation of Elliott Laws' information related to the P4 disposal and the ROD.

2. Summary of the difference between "cost effectiveness" and "cost/benefit analysis" and why the statute required the former. Jim thought you had something from historical questions.

3. The Principal threat guidance that supports how it is being applied at Portland Harbor.

Please see me if you have any questions or what more context. Thanks.

To: Anderson, RobinM[Anderson.RobinM@epa.gov]; Openchowski, Charles[openchowski.charles@epa.gov]
From: Cora, Lori
Sent: Thur 7/23/2015 5:30:32 PM
Subject: FW: Portland Harbor Revised ARARs tables

Lori Houck Cora | **Assistant Regional Counsel**
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Vrooman Gary L [mailto:Gary.L.Vrooman@doj.state.or.us]
Sent: Wednesday, July 22, 2015 4:55 PM
To: Cora, Lori
Subject: RE: Portland Harbor Revised ARARs tables

Hi Lori,

DEQ believes the following subsections from OAR 340-095-0020, "operating criteria," are also substantive requirements that would be relevant to a CDF:

-5 Leachate

-7 Drainage Control

-10 FloodPlains

-11 Cover material

-12 Cover frequency

-13 Access Roads

-14 Access Control

-15 Site Screening

-18 Truck Washing

-17 Signs

-21 Litter

-22 Vector and Bird Control

Some of these like leachate, drainage control and flood plain requirements may be covered by other federal ARARs.

Gary Vrooman

971.673.1878

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, July 13, 2015 12:28 PM
To: Vrooman Gary L
Cc: Koch, Kristine; Sheldrake, Sean
Subject: Portland Harbor Revised ARARs tables

Hi, Gary. Attached are revised ARARs tables for the Portland Harbor FS. We have added to action-specific ARAR table the solid waste regulations relevant to a non-municipal solid waste landfill that DEQ identified and EPA found to be relevant and appropriate. Also, given that the FS alternatives include the possibility that the transloading facility where dredged materials would be staged (stored) and, if hazardous waste, possibility treated prior to shipment off-site, we have added references to several more RCRA accumulation, and hazardous waste storage, treatment and closure regulations. We have noted the Oregon citations where federal RCRA haz. waste requirements were adopted by the state. We have added some of Oregon's requirements that are broader than RCRA. However, please let us know if there are any other state hazardous waste requirements for the storage, treatment or closure that are more stringent than Part 264 that should be added to the tables. If DEQ could let us know if there are any other state ARARs before July 22th, we will have time to discuss them if needed and finalize the tables before the July 29 when FS Chapter 3 will be provided to the LWG. Thanks.

Lori Houck Cora | **Assistant Regional Counsel**
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To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Fri 7/10/2015 8:50:33 PM
Subject: FW: Updated Section 4 text and comparative analysis for ARARs and Reduction of Toxicity, Mobility and Volume
2015-07-08_Portland Harbor FS Section 4_Toxicity_ARARs update.doc
Visual Comparative Analysis_PH FS.docx
2015-07-08_Table 4 3-1_Comparative Analysis_TMV_ARAR .doc

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Wednesday, July 08, 2015 9:13 PM
To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina; Legare, Amy
Cc: Borisova, Eleonora; Hazen, Gary; Mullin, Jeanette; Blischke, Eric; Jones, Jennifer M.; Roberts, Keegan; King, Todd W.; Sonawane, Abhay; Broadstone, Abby
Subject: Updated Section 4 text and comparative analysis for ARARs and Reduction of Toxicity, Mobility and Volume

Please find attached an updated version of FS Section 4 text and comparative analysis tables (one table provides brief narrative, while the other provides the visual ranking.

The text is updated for ARARs and incorporates EPA comments received during the ARAR meeting on July 2nd. The text also include draft text for the Reduction of Toxicity, Mobility and Volume criterion.

Please note: We have not modified Implementability text and the Short-Term Effectiveness section from this version you provided us on July 1st. We understand that these two criteria are still going through EPA editing.

Once EPA is completed with editing those criteria, we will input the quantitative information and address any remaining comments as we complete the other criteria write-ups and finalize the document

Scott

Scott Coffey, L.Hg.
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To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Thur 7/2/2015 5:09:10 PM
Subject: FW: Initial comments on ARARs compliance chart
Cora2015-06-26_Table 4 2-3_Compliance with ARARs Detailed Evaluation.docx

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Koch, Kristine
Sent: Wednesday, July 01, 2015 8:24 PM
To: Fonseca, Silvina
Subject: FW: Initial comments on ARARs compliance chart

Silvina – I attached these to the meeting invite, but in case people weren't aware please send these around.

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Cora, Lori
Sent: Wednesday, July 01, 2015 4:32 PM
To: Koch, Kristine; Sheldrake, Sean
Cc: Grandinetti, Cami; Zhen, Davis
Subject: Initial comments on ARARs compliance chart

Here are my initial comments and questions to discuss tomorrow at 10 a.m. Please send this to folks in HQ and CDM who will be on the call tomorrow. Thanks.

Lori Houck Cora | Assistant Regional Counsel
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To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Wed 6/10/2015 2:57:36 PM
Subject: FW: Draft Alternatives Development and Screening Sections 3.7 and 3.8
Table 3.7-1_PH_FS_RT-PO Evaluation for Assembly into Alternatives_052615....docx
Table 3.7-2_Alternative Summary of Acres by Technology_REV1.xlsx
Table 3.7-3_DredgeVolumes.xlsx
Appendix F_Table F-1_Effectiveness Screening_060215.docx
Appendix F_Table F-2_Implementability Table_060215.docx
Appendix F_Screening Costs_V09_060215.pdf
Portland Harbor FS Section 3 7-3 8_Alt Development-Screen_2015-06-03.docx

More info.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Wednesday, June 03, 2015 1:31 PM
To: Koch, Kristine; Fonseca, Silvina
Cc: Mullin, Jeanette; Allen, Elizabeth; Sheldrake, Sean
Subject: Draft Alternatives Development and Screening Sections 3.7 and 3.8
Importance: High

Kristine and Silvina.

Attached are FS Section 3.7-Alternative Development and FS Section 3.8-Alternative Screening for your review. Also attached is Appendix F (screening tables and screening cost estimate) that supports FS Section 3.8 screening. Figures will be sent in several separate emails due to file sizes.

Regards,

Scott

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To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Wed 6/10/2015 2:56:23 PM
Subject: FW: Portland Harbor FS Sections 3.7/3.8 - Figures Part 2 of 2
Figure 3.7-5_Predom-Tech-by-RM-with-PTW-SwanIs-AltD.PDF
Figure 3.7-6_Predom-Tech-by-RM-with-PTW-SwanIs-AltE.PDF
Figure 3.7-7_Predom-Tech-by-RM-with-PTW-SwanIs-AltF.PDF
Figure 3.7-8_Predom-Tech-by-RM-with-PTW-SwanIs-AltG.PDF
Figure 3.8-1_Effectiveness_ReplValue0_REV1.pdf

Here are some of the PTW figures.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Wednesday, June 03, 2015 1:38 PM
To: Koch, Kristine; Fonseca, Silvina
Cc: Mullin, Jeanette; Allen, Elizabeth; Sheldrake, Sean
Subject: Portland Harbor FS Sections 3.7/3.8 - Figures Part 2 of 2

Figures: Part 2 of 2

Attached are figures associated with Portland Harbor FS Section 3.7-Alternative Development and FS Section 3.8-Alternative Screening.

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To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Wed 6/10/2015 2:56:26 PM
Subject: FW: Portland Harbor FS Section 3 - Appendix C: Cap Modeling to support PTW subsection
Appendix C_PTW Cap Modeling.docx
Figure C-1_Chlorobenzene_02-June-2015.pdf
Figure C-2_Naphthalane_02-June-2015.pdf
Table C-1_Chemical Properties of Modeled COCs.xlsx
Table C-2_COC Concentration Criteria for Modeling.xlsx
Table C-3_Sediment Bed COC Concentrations for Model.xlsx
Table C-4_Representative Process Option Cap Model Inputs.xlsx

More figures related to the cap modelling.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Wednesday, June 03, 2015 1:38 PM
To: Koch, Kristine; Fonseca, Silvina
Cc: Mullin, Jeanette; Allen, Elizabeth; Sheldrake, Sean
Subject: Portland Harbor FS Section 3 - Appendix C: Cap Modeling to support PTW subsection

Kristine and Silvina:

Attached is Appendix C: Principal Threat Waste Cap Modeling for review. This appendix supports FS Section 3.2 – PTW, which is currently being revised by EPA.

Regards,

Scott

Scott Coffey, L.Hg.

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To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Wed 6/10/2015 2:36:18 PM
Subject: FW: Portland Harbor FS Section 3
2015-06-09 Portland Harbor FS Section.docx

Robin,

Here is the revised section 3, still working on the document as you can see from Kristine's email below. Please look through the disposal section and Lori Cora's comment to make sure her comments were addressed and that we are comfortable with it as well.

I will send you the PTW maps/figures.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Koch, Kristine
Sent: Tuesday, June 09, 2015 8:09 PM
To: Fonseca, Silvina; Allen, Elizabeth; Christopher, Anne; Legare, Amy
Subject: Portland Harbor FS Section 3

Here is the latest version. We have included Silvina' s and Anne's comments and language on capping and dredging technologies, so text in section 3.3 is complete, although not fully edited. Please review the text for substantive issues. We can discuss further tomorrow after the TCT.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122

Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

To: Gustavson, Karl[Gustavson.Karl@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Thur 5/21/2015 8:29:58 PM
Subject: FW: Revised FS Section 3 Subsections for Review - Part 1 of 6
Portland Harbor FS Section 3_REV1_2015-05-15.docx
Portland Harbor FS Section 3_REV1_2015-05-15_markup.docx
FS Section 3 - List of Figures_2015-05-12.xlsx
FS Section 3 - List of Tables_2015-05-12.xlsx
Table 3.3-1_SDU Primary Contaminants_2015-03-16.xlsx
Table 3.6-1_PTW Concentration Threshold Table_2015-02-23.xlsx
Table 3.6-2_CDF Performance Standards.docx
Table 3.6-3_T4 60 Percent CDF DAR_Table 2-1 Monitoring.pdf
Table 3.5-1_SMA Summary Information_REV1.xlsx
Table 3.6-4_Predominant Technology Acres Summary_REV 1.xlsx

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Fonseca, Silvina
Sent: Thursday, May 21, 2015 4:23 PM
To: Ells, Steve; Charters, David; Legare, Amy; Anderson, RobinM; Gustavson, Karl
Subject: FW: Revised FS Section 3 Subsections for Review - Part 1 of 6

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Friday, May 15, 2015 6:15 PM
To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina

Cc: Mullin, Jeanette; King, Todd W.; Foster, Malena L.; Hazen, Gary; Jones, Jennifer M.
Subject: Revised FS Section 3 Subsections for Review - Part 1 of 6

Attached is a clean version and marked up version of the FS Section 3 subsections identified below for EPA review. These subsections were revised based on EPA HQ comments and Region 10 direction.

- 3.1 Remedial Alternative Development Strategy
- 3.2 Focused COCs
- 3.3 Sediment Decision Units
- 3.4 Remedial Action Levels
- 3.5 Sediment Management Areas
- 3.6 Remedial Technology Assignment
  - 3.6.1 Principal Threat Waste
  - 3.6.2 Benthic Risk Areas
  - 3.6.3 Sediment Disposal and Management
  - 3.6.4 MNR Considerations
  - 3.6.5 EMNR Considerations
  - 3.6.6 In-Situ Treatment
  - 3.6.7 Dredging and Excavation Considerations
  - 3.6.8 Representative Caps and Capping Considerations
  - 3.6.9 IC Consideration
  - 3.6.10 Assignment of Technologies to SMAs

Also attached is a list of figures and a list of tables for the FS Section 3 subsections being submitted. Figures and appendices will be sent in six separate emails due to the large number of figures and large file sizes.

Please note: We are still working on volume determinations as a result of the revision made to the processing rules for technology assignment on April 30th. As a result, we have placeholders for this information and will provide a final draft of Section 3.6 **later next week** and a submittal of the alternatives screening section (Section 3.7) by **May 27th**.

Regards,

Scott

Scott Coffey, L.Hg.
Hydrogeologist
CDM Smith | consulting engineering construction operations
1218 Third Avenue, Suite 1100 | Seattle, WA 98101
phone: (206) 336-4904 | fax: (206) 223-2340 / mobile (206) 457-9270
email: coffeyse@cdmsmith.com | www.cdmsmith.com

To: Gustavson, Karl[Gustavson.Karl@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Thur 5/21/2015 8:29:24 PM
Subject: FW: Draft FS Section 3 Subsections for Review - Figures Part 3 of 6
Figure 3.4-2a_Total-PCB-RALs_REV1.pdf
Figure 3.4-2b_Total-PAH-RALs_REV1.pdf
Figure 3.4-2c_TCDD-RALs_REV1.pdf
Figure 3.4-2d_PeCDD-RALs_REV1.pdf
Figure 3.4-2e_PeCDF-RALs_REV1.pdf
Figure 3.4-2f_Total-DDX-RALs_REV1.pdf
Figure 3.5-1_SMAs w banks_REV2.pdf
Figure 3.6-01_Arkema_NAPL.PDF
Figure 3.6-02_Gasco_NAPL.PDF
Figure 3.6-03_PTW Site-Wide Concentrations_REV1.pdf
Figure 3.6-04_Arkema-NAPL_PTW_REV1.pdf
Figure 3.6-05_Gasco_NAPL_PTW.PDF

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Fonseca, Silvina
Sent: Thursday, May 21, 2015 1:57 PM
To: Ells, Steve; Legare, Amy; Charters, David
Subject: FW: Draft FS Section 3 Subsections for Review - Figures Part 3 of 6

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Friday, May 15, 2015 6:22 PM

To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina
Subject: Draft FS Section 3 Subsections for Review - Figures Part 3 of 6

Second set of figures

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To: Gustavson, Karl[Gustavson.Karl@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Thur 5/21/2015 8:28:45 PM
Subject: FW: Draft FS Section 3 Subsections for Review - Figures Part 4 of 6
Figure 3.6-06_Benthic-Risk-Areas.pdf
Figure 3.6-07_RCRA-Wastes_REV1.pdf
Figure 3.6-08_Sediment Disposal Decision Tree_2015-05-14.pdf
Figure 3.6-09_2012-03-30_Draft FS_Appendix Ja_T4 CDF.PDF
Figure 3.6-10_Nav-Channel-and-Potential-Dredge_REV1.pdf
Figure 3.6-11_NAPL_50ftDepth_REV1.pdf
Figure 3.6-12_Grapple_Bucket.pdf
Figure 3.6-13_Debris-Pilings_REV1.pdf
Figure 3.6-14_Docks-Structures_REV1.pdf
Figure 3.6-15_Sand Cap Cross-Section.pdf
Figure 3.6-16_Vegetated Slope-Geocell.pdf
Figure 3.6-17_Geocell Photo.pdf

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Fonseca, Silvina
Sent: Thursday, May 21, 2015 1:56 PM
To: Ells, Steve; Charters, David; Legare, Amy
Subject: FW: Draft FS Section 3 Subsections for Review - Figures Part 4 of 6

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Friday, May 15, 2015 6:23 PM

To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina
Subject: Draft FS Section 3 Subsections for Review - Figures Part 4 of 6

Third set of figures.

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To: Gustavson, Karl[Gustavson.Karl@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Thur 5/21/2015 8:28:05 PM
Subject: FW: FS Section 3 Subsections for Review: Appendix D-CDF Water Quality - Part 6 of 6 (but there will be 7 actually)
Appendix D_CDF Water Quality.docx
Appendix D_Figure D-1_T4 Plan View.pdf
Appendix D_Figure D-2_T4 CDF Model Structure.pdf
Appendix D_Figure D-3_T4 CDF GW Flow.pdf
Appendix D_Figure D-4a-d_T4 COC Concentrations.pdf
Appendix D_Figure D-5_T4 CDF Contaminant Distribution.pdf
Appendix D_Table D-1_Elutriate Tests_REV1.pdf
Appendix D_Table D-2_Bulk Sediment-Leachate_REV1.pdf
Appendix D_Table D-3_Physical Properties of CDF Material.pdf
Appendix D_Table D-4_Geochemical Properties of COCs.pdf

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Fonseca, Silvina
Sent: Thursday, May 21, 2015 1:56 PM
To: Ells, Steve; Charters, David; Legare, Amy
Subject: FW: FS Section 3 Subsections for Review: Appendix D-CDF Water Quality - Part 6 of 6 (but there will be 7 actually)

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Friday, May 15, 2015 6:28 PM

To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina
Subject: FS Section 3 Subsections for Review: Appendix D-CDF Water Quality - Part 6 of 6 (but there will be 7 actually)

Attached is Appendix D: CDF Water Quality that accompanies the FS Section 3 subsections being submitted to EPA for review.

I thought this would be the last email transmittal for the sections, figures, tables and appendices, but I have to send the other appendix separately, so you will have 7 email transmittals in all.

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To: Gustavson, Karl[Gustavson.Karl@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Thur 5/21/2015 8:27:47 PM
Subject: FW: FS Section 3 Subsections for Review: Appendix E-Tech Assignment Support
Appendix E_Tech Assignment Support_2015-05-12.docx
Attachment E-1_2012-03-30_Draft FS_Appendix Hc_Attach 1_Wake Analysis.pdf
Figure E-1_2012-03-30_Draft FS_Appendix Hc_Figure 4-1_Wind Rose.pdf
Figure E-2_2012-03-30_Draft FS_Appendix La_Figure 2-1_Numerical Grid Ext....pdf
Figure E-3a_2012-03-30_Draft FS_Appendix La_Figure 2-30_Sediment Bed Dat....pdf
Figure E-3b_2012-03-30_Draft FS_Appendix La_Figure2-31_Sediment Bed Data....pdf
Figure E-4_2012-03-30_Draft FS_Appendix La_Figure 2-32_Sediment Bedmap.pdf
Figure E-5_2012-03-30_Draft FS_Appendix La_Figure 2-33_Spatial Distribut....pdf
Figure E-6a_2012-03-30_Draft FS_Appendix La_Figure 2-34_Bed Composition.pdf
Figure E-6b_2012-03-30_Draft FS_Appendix La_Figure 2-35_Bed Composition.pdf
Figure E-7_2012-03-30_Draft FS_Appendix La_Figure 2-36_Sedflume Location....pdf
Figure E-8 thru E-22_2012-03-30_Draft FS_Appendix La_Figures_Log-Linear ....pdf
Figure E-23_2012-03-30_Draft FS_Appendix La_Figure 2-52_Vertical Variati....pdf

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Fonseca, Silvina
Sent: Thursday, May 21, 2015 1:56 PM
To: Ells, Steve; Legare, Amy; Charters, David
Subject: FW: FS Section 3 Subsections for Review: Appendix E-Tech Assignment Support

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]

Sent: Friday, May 15, 2015 6:30 PM
To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina
Subject: FS Section 3 Subsections for Review: Appendix E-Tech Assignment Support

Attached is Appendix E: Technology Assignment Supporting Documentation that accompanies the FS Section 3 subsections being submitted to EPA for review.

This is the 7th and final email transmittal.

Scott

Scott Coffey, L.Hg.
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email: coffeyse@cdmsmith.com | www.cdmsmith.com

To: Legare, Amy[Legare.Amy@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]; Ells, Steve[Ells.Steve@epa.gov]; Gustavson, Karl[Gustavson.Karl@epa.gov]; Charters, David[Charters.DavidW@epa.gov]
Cc: Ammon, Doug[Ammon.Doug@epa.gov]; Stalcup, Dana[Stalcup.Dana@epa.gov]
From: Fonseca, Silvina
Sent: Mon 5/11/2015 3:39:25 PM
Subject: FW: Portland Harbor FS section 2
2015-02-23_Figure 2.2-2 PRG-Footprints.pdf
2015-05-08 Appendix B1_HH PRGs.docx
2015-05-08 Appendix B2_Ecological PRGs.docx
2015-05-08 CLEAN Portland Harbor FS Section 2.docx
2015-05-08 Portland Harbor FS Section 2.docx
2015-05-08 Section 2 Tables.xlsx
2015-05-08 Table 2.4-01 Technical Implementability Screening Table.xlsx
2015-05-08 Table 2.4-02 Technology Process Option ScreeningTable.xlsx
2015-05-08 Table 2.4-3 CAD_CDF Evaluation Matrix.docx
2015-05-08 Table B2_Portland Harbor Eco PRGs.xlsx
2015-05-08 Tables 2.1-1 through 2.1-3 ARARs.xlsx
2015-05-208 Table B1_Portland Harbor HH PRGs.xlsx

Hi Team,

See Kristine's email below. Let's give this Section one last look and then touch base tomorrow. We are scheduled to discuss with Kristine on Wed pm, however, let's see if we can touch base on this tomorrow pm. Maybe around 3 pm, that will give folks an opportunity to get their thoughts together.

Let me know if you have any questions.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Koch, Kristine
Sent: Friday, May 08, 2015 6:04 PM
To: Fonseca, Silvina
Cc: Allen, Elizabeth
Subject: Portland Harbor FS section 2

Silvina – Here are the updated files for the Portland Harbor FS – Section 2. Please forward to others at HQ. I have asked Dave to review some additional information regarding Appendix B2 and RAO 5. Elizabeth is still evaluating whether TPH (C10-C12) Aliphatics remains a COC and Dave is working on this, too. Other than those two issues, I believe everything else is resolved. Therefore, I would like everyone to take one final look at this section and see if there are any lingering issues. Please provide any edits to the CLEAN version so we can see the changes.

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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To: Legare, Amy[Legare.Amy@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]; Ells, Steve[Ells.Steve@epa.gov]; Charters, David[Charters.DavidW@epa.gov]
From: Fonseca, Silvina
Sent: Tue 4/21/2015 10:09:15 PM
Subject: FW: Comments due 4/23/15 - PH - Draft Communication Plan, Congressional Talking Points and Press Release Points for Direction to LWG to Complete RI
2015 4-21 DRAFT Comm Plan - Completion of RI.docx
2015 4-21 DRAFT Congressional Talking Points - Completion of RI.docx
2015 4-21 DRAFT Press Release Points - Completion of RI.docx

Please let me know if you have any comments as soon as you can. Thanks!

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Robinson, Deborah
Sent: Tuesday, April 21, 2015 5:55 PM
To: Koch, Kristine; Sheldrake, Sean; Christopher, Anne; Muza, Richard; Allen, Elizabeth; Conley, Alanna; Cora, Lori; Fonseca, Silvina; Legare, Amy; MacIntyre, Mark; Schuster, Cindy; Dunbar, Bill
Cc: Ammon, Doug; Stalcup, Dana; Yamamoto, Deb; Grandinetti, Cami; Cohen, Lori
Subject: Comments due 4/23/15 - PH - Draft Communication Plan, Congressional Talking Points and Press Release Points for Direction to LWG to Complete RI

Dear PH Team,

Please forward this as needed.

Attached are 3 draft documents related to Monday's planned email directing the LWG to complete the RI:

•□□□□□□□□ Draft Communication Plan

•□□□□□□□□ Draft Congressional Talking Points

•□□□□□□□□ Draft points for Press Release

Due date for comments on the documents is 4/23. Alanna and I will finalize talking points and I will finalize communication plan.

===================================

From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

To: Woolford, James[Woolford.James@epa.gov]
Cc: Stalcup, Dana[Stalcup.Dana@epa.gov]; Fonseca, Silvina[Fonseca.Silvina@epa.gov]; Ells, Steve[Ells.Steve@epa.gov]; Cooper, DavidE[Cooper.DavidE@epa.gov]; Legare, Amy[Legare.Amy@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]; Gustavson, Karl[Gustavson.Karl@epa.gov]; Richardson, RobinH[Richardson.RobinH@epa.gov]
From: Ammon, Doug
Sent: Thur 4/16/2015 8:49:46 PM
Subject: CONFIDENTIAL – DELIBERATIVE PROCESS : Vulnerability Issues
Portland Harbor FS Issues James Woolford 4-16.docx

Attached is the one pager on potential vulnerability issues.

To: Stalcup, Dana[Stalcup.Dana@epa.gov]; Ammon, Doug[Ammon.Doug@epa.gov]
Cc: Charters, David[Charters.DavidW@epa.gov]; Ells, Steve[Ells.Steve@epa.gov]; Legare, Amy[Legare.Amy@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]; Gustavson, Karl[Gustavson.Karl@epa.gov]
From: Fonseca, Silvina
Sent: Thur 4/16/2015 7:46:59 PM
Subject: Vulnerability Issues - one pager for Jim
Portland Harbor FS Issues James Woolford 4-16.docx

Doug and Dana,

Here is the one pager per Jim's request. Please let me know if you have any questions or feel free to modify and move it up to Jim. This has been reviewed by the team.

Please send me the final and I will share with the team.

Thank you!

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Wed 4/15/2015 5:56:14 PM
Subject: Emailing: Portland Harbor FS Section 3.5.1-Source Material_Working Draft_SF Comments 2015-03-2....docx
Portland Harbor FS Section 3.5.1-Source Material_Working Draft_SF Comments 2015-03-2....docx

Your message is ready to be sent with the following file or link attachments:

Portland Harbor FS Section 3.5.1-Source Material_Working Draft_SF Comments 2015-03-2....docx

Note: To protect against computer viruses, e-mail programs may prevent sending or receiving certain types of file attachments. Check your e-mail security settings to determine how attachments are handled.

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Wed 4/15/2015 4:47:23 PM
Subject: Section 3 - 1st Part FS Working Draft SJE DWC SF Comments Revised.docx
Section 3 - 1st Part FS Working Draft SJE DWC SF Comments Revised.docx

Here is the bulk of Section 3 which has PTW section and other things. It includes Ells, Charters and my comments.

To: Fonseca, Silvina[Fonseca.Silvina@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]; Legare, Amy[Legare.Amy@epa.gov]; Openchowski, Charles[openchowski.charles@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]
From: Cora, Lori
Sent: Fri 3/27/2015 6:12:03 PM
Subject: Correspondence between EPA and LWG re: ARARs
2010-02-01 ARAR Questions For EPA.pdf
answer LWG.pdf

Per our discussion today, attached is my letter from 2010 apparently referred to by the LWG (I still have not looked at their comments) and their submission that I was responding to.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Thur 2/26/2015 7:01:15 PM
Subject: RE: Hey
2015_02_23 Portland Harbor FS Section 2.docx
2015-02-23 Appendix B2_Ecological PRGs.docx

Sorry about Hanford. No decisions on the project. Also, next week we need to work on the RAOs of PH. They are almost there, but they have gone and modified another RAO due to the ARAR for AWQC. So I will need your help and bring Amy in again. In addition, they have language that discusses some principles that they will also use to look at alternatives as it deals with habitat restoration. I am attaching the document so you can start reading.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Anderson, RobinM
Sent: Thursday, February 26, 2015 1:51 PM
To: Fonseca, Silvina
Subject: RE: Hey

Not having fun on the Hanford situation. Don't understand what is going on – seems that there are some discussions going on in R10 with Jim. At a loss on that one.

Oh – and it snowed again – no surprise there.

I provided comments on the lead strategy, I cced you.

How is it going there?

Are you on or off the project?

From: Fonseca, Silvina
Sent: Thursday, February 26, 2015 1:18 PM
To: Anderson, RobinM
Subject: Hey

How is it going without all the bosses?

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Thur 8/7/2014 6:35:38 PM
Subject: FW: Principal Threat Waste Response
2014_08_07_Principal Threat Waste Response.pdf

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Yamamoto, Deb
Sent: Thursday, August 07, 2014 1:14 PM
To: Fonseca, Silvina
Subject: FW: Principal Threat Waste Response

FYI.

From: Koch, Kristine
Sent: Thursday, August 07, 2014 10:03 AM
To: Cohen, Lori; Yamamoto, Deb; Cora, Lori
Cc: Sheldrake, Sean
Subject: FW: Principal Threat Waste Response

This is the type of responses I get from the LWG during our non-binding deliberations. They don't discuss these in the meetings, but send us dispute statements. I guess this will help with our development of the FS, but I'm not inclined to respond to these.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency

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From: Jennifer Woronets [mailto:jworonets@anchorqea.com]
Sent: Thursday, August 07, 2014 9:54 AM
To: Koch, Kristine
Cc: Amanda Shellenberger; Bob Wyatt; Carl Stivers; Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); King, Todd W.; Mullin, Jeanette; Patty Dost; Scott Coffey (coffeyse@cdmsmith.com); Sheldrake, Sean
Subject: FW: Principal Threat Waste Response

Kristine,

Please see below and attached from Carl.

Let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

From: Carl Stivers
Sent: Thursday, August 07, 2014 9:48 AM
To: Jennifer Woronets
Cc: 'jim.mckenna@verdantllc.com'; Bob Wyatt; Amanda Shellenberger
Subject: Principal Threat Waste Response

Kristine – Please find attached the LWG's responses to EPA's FS memoranda (by CDM dated April 10, 2014 and June 6, 2014) regarding the identification and evaluation of Principal Threat Waste (PTW) at Site. This response is provided to facilitate resolution of outstanding issues as part of the non-binding information exchange process for the revised FS. We would be happy to discuss this at the next FS technical session or at your earliest convenience.

Please let me know if you have any questions about the memorandum.

Thanks.

Carl

Carl Stivers

ANCHOR QEA, LLC
cstivers@anchorqea.com
23 S. Wenatchee Ave, Suite 220
Wenatchee, WA 98801
Phone: 509.888.2070

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Fonseca, Silvina
Sent: Mon 12/14/2015 5:41:23 PM
Subject: RE: Revised Portland Harbor FS memo with options and schedules

Lori,

Do we have any updated paper for the call tonight?

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Cora, Lori
Sent: Monday, November 30, 2015 7:56 PM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>; Northridge, Michael <Northridge.Michael@epa.gov>
Subject: Revised Portland Harbor FS memo with options and schedules

Hello. Per our conference call today, I've added the three options we discussed with the timelines each would have relative to dispute and remedy selection process. Please provide comments and changes. There is a meeting with McLerran and Woolford trying to be scheduled for next week to discuss the options with them.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Cora, Lori[Cora.Lori@epa.gov]; Stern, Allyn[Stern.Allyn@epa.gov]
From: Ingemansen, Dean
Sent: Fri 12/11/2015 11:30:04 PM
Subject: options paper with Cyndy's "option 5" added
Options 3 and 4 fleshed out with Option 5 added-deans comments-12-11-15.docx

I've tried to incorporate Cyndy's option, as well as Allyn's comments. Lori, can you complete the analysis in Option 5?

Thanks.

-Dean

To: Cora, Lori[Cora.Lori@epa.gov]; Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Stern, Allyn
Sent: Fri 12/11/2015 10:27:32 PM
Subject: a couple comments from me
Options 3 and 4 fleshed out-deans comments-12-10-15 als.docx
PH finalizing FS options 12_7_2015 (00000003) als.docx

Call you in a bit. Dean said he was free at 2:30

To: Magorrian, Matthew[Magorrian.Matthew@epa.gov]
Cc: Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]
From: Robinson, Deborah
Sent: Thur 12/10/2015 11:08:05 PM
Subject: Request for meeting with Dennis by COB Monday

Hi Matt,

We are requesting a meeting to finish discussing the strategy for completing the Portland Harbor FS.

- Lori Cora will present fleshed out options 3 and 4 based on her previous legal analysis.
- Decisions will be made on

o the strategy

o whether and how to talk to the Administrator about the decision

Aiming to have the meeting by COB Monday if possible, to allow follow up with the Administrator.

- Friday between 10-12 is workable for Lori Cora.
- Cami has time set aside on Jim Woolford's calendar Monday at 1:00, so if others are available it may be convenient.

Must be there:

Dennis, Jim Woolford, Cyndi Mackey, Lori Cora, Cami (she will rearrange other commitments to be there.)

Good if they can be there:

Allyn Stern, Dean Ingemansen, Mike Northridge, Michelle Pirzadeh

Please invite the PH team as optional (same group that was invited to the briefing on this topic that was held yesterday.)

I know Dennis is slammed so if he looks booked, please check with Michelle and/or him about how to fit this meeting in.

Thanks,

Debbie

==================================
From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

To: Cora, Lori[Cora.Lori@epa.gov]; Robinson, Deborah[Robinson.Deborah@epa.gov]
From: Koch, Kristine
Sent: Tue 12/8/2015 4:20:10 PM
Subject: RE: Tribes' comments to NRRB
Comments to NRRB_CSTAG from 5Tribes.pdf
Comments to NRRB_CSTAG from Yakama Nation.pdf

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Tuesday, December 08, 2015 8:12 AM
To: Robinson, Deborah <Robinson.Deborah@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>
Subject: Tribes' comments to NRRB

Hi, Debbie and Kristine. Do you have these letters you can send to me, I can't remember where on the share drive all that stuff got put. Thanks. I need them ASAP. Thanks again.

Lori Houck Cora | Assistant Regional Counsel
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To: Cora, Lori[Cora.Lori@epa.gov]; Northridge, Michael[Northridge.Michael@epa.gov]
From: Mott, Patricia
Sent: Tue 12/1/2015 4:02:03 PM
Subject: RE: Revised Portland Harbor FS memo with options and schedules

Great. We'll be sure to get to Ken, Ben and Cyndy before next week.

From: Cora, Lori
Sent: Monday, November 30, 2015 9:07 PM
To: Northridge, Michael <Northridge.Michael@epa.gov>
Cc: Mott, Patricia <Mott.Patricia@epa.gov>
Subject: RE: Revised Portland Harbor FS memo with options and schedules

Yes, I put Cyndy on the list for the invite. Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Northridge, Michael
Sent: Monday, November 30, 2015 4:58 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Mott, Patricia <Mott.Patricia@epa.gov>
Subject: RE: Revised Portland Harbor FS memo with options and schedules

Let's get Cyndy Mackey included too (even though neither Ken Patterson nor Ben Lammie were able to join us today --- I hope Trish raises this to them (and her) asap).

From: Cora, Lori
Sent: Monday, November 30, 2015 7:56 PM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>; Northridge, Michael <Northridge.Michael@epa.gov>
Subject: Revised Portland Harbor FS memo with options and schedules

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Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Northridge, Michael[Northridge.Michael@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Mott, Patricia
Sent: Tue 12/1/2015 1:13:45 PM
Subject: RE: Revised Portland Harbor FS memo with options and schedules

Mike, would you like to attend my general with Ken and Ben Thursday morning?

Tricia

From: Northridge, Michael
Sent: Monday, November 30, 2015 7:58 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Mott, Patricia <Mott.Patricia@epa.gov>
Subject: RE: Revised Portland Harbor FS memo with options and schedules

Let's get Cyndy Mackey included too (even though neither Ken Patterson nor Ben Lammie were able to join us today --- I hope Trish raises this to them (and her) asap).

From: Cora, Lori
Sent: Monday, November 30, 2015 7:56 PM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>; Northridge, Michael <Northridge.Michael@epa.gov>
Subject: Revised Portland Harbor FS memo with options and schedules

Hello. Per our conference call today, I've added the three options we discussed with the timelines each would have relative to dispute and remedy selection process. Please provide comments and changes. There is a meeting with McLerran and Woolford trying to be scheduled for next week to discuss the options with them.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Lori Cora
Sent: Mon 11/30/2015 7:06:35 PM
Subject: Fw: PH Update

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

----- Forwarded by Lori Cora/R10/USEPA/US on 11/30/2015 11:06 AM -----

From: Chip Humphrey/R10/USEPA/US
To: Deb Yamamoto/R10/USEPA/US@EPA,
Cc: Kristine Koch/R10/USEPA/US@EPA, Lori Cora/R10/USEPA/US@EPA, Richard Muza/R10/USEPA/US@EPA, Sean Sheldrake/R10/USEPA/US@EPA
Date: 01/11/2013 03:04 PM
Subject: Re: PH Update

Re: the BERA

Burt is finishing up the items (a couple of summary tables and a few additional text changes) that we owe the LWG. We will only be sending tables and updated text changes to the exec summary and conclusions section. Burt hasn't identified any other text changes (for the main body of the report) but we"ll be working with LWG on other text changes that will be needed so the final document reflects the additional work the LWG is currently doing to address our comments and is consistent with summary and conclusions.

-----Kristine Koch/R10/USEPA/US wrote: -----
To: Deb Yamamoto/R10/USEPA/US@EPA
From: Kristine Koch/R10/USEPA/US
Date: 01/11/2013 02:09PM
Cc: Chip Humphrey/R10/USEPA/US@EPA, Kristine Koch/R10/USEPA/US@EPA, Lori Cora/R10/USEPA/US@EPA, Sean Sheldrake/R10/USEPA/US@EPA, Richard Muza/R10/USEPA/US@EPA
Subject: PH Update

Deb - Here is an update on PH activities

Jan 8th
G2G with Yakama.
Follow up: Draft letter from Dennis to Tribal Council - Sent to Lori Cohen on Jan 11th (Kristine)
Jan 9th

PH TCT
Follow up: Set dates in Feb for 2 day meeting to discuss COCs, PRGs, and RALs (will include Burt & Elizabeth) (Chip)

PH Mgr (Chip, Kristine, Bob & Jim)
Agreed to modify process for RI to have discussions prior to submittal of sections.
Discussed FS - where do we go now? Who does what? Schedule? Decided to develop broad tasks that will allow scheduling, but specific subtasks will be developed later.
Jan 10th
PH FS
Follow up: Develop FS tasks (both EPA and LWG) and meet on Jan 18 to discuss roles - EPA/CDM has done this and will be updating prior to meeting. (Chip)

PH BHHRA
Status: On schedule
Will have another check-in on Jan 24.
Follow up: Send Laura/Jim draft modifications to text - sent Jan 11th (Elizabeth)

PH RI
Agreed that LWG can make changes such as numbering conventions for maps/tables/figures and spelling of acronyms 1st time without discussing with EPA
All other changes they would like to see need to be discussed with EPA.
Final version will be clean (no redline) - expect that all language will be how EPA has redlined it or as EPA has agreed to be modified through negotiations.

PH BERA
Burt held a conf call this morning. Not sure what was discussed.

Jan 11
PH BERA
Redline of BERA language to send to LWG (all I have seen so far is a modification to the Executive Summary that was already sent in December) (Chip/Burt)

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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Seattle, Washington 98101-3140

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(206)553-0124 (fax)
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To: Carl Stivers[cstivers@anchorqea.com]
Cc: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Wed 11/25/2015 6:37:24 PM
Subject: Portland Harbor Information Request
Anchor QEA Erosion Control Unit Costs (Tables 6 and 7 of Backup Submittal).pdf
Fig3-06-02_Tech-Assign-AltB.pdf
Fig3-06-04_Tech-Assign-AltD.pdf
Fig3-06-05_Tech-Assign-AltE.pdf
Fig3-06-06_Tech-Assign-AltF.pdf
Fig3-06-07_Tech-Assign-AltG.pdf
Figure 3.2-05_PTW-Concentrations.pdf
Quantity Backup for Sheet Pile and Silt Curtains.pdf

Carl, Here is the information for LWG's request #25.

The unit costs were derived by escalating the 2010 Anchor QEA unit costs, which were based on a linear foot (see attached). We assume the costs include

- □□□□□□□□ Purchasing, Installing and Removing the Sheet Pile Walls and
- □□□□□□□□ Purchasing, Installing and Maintaining Silt Curtains

Note: It is unclear the depth of the sheet piles assumed by Anchor QEA in their unit cost.

The quantity backup we presented in the estimate is attached for reference. These quantities were developed using the attached figures (note that the dark blue lines with comments indicate silt curtain lengths for each alternative, and green lines with comments in Figure 3.2 indicate the sheet pile lengths). In summary, sheet pile was assumed around PTW at Arkema and GASCO, and silt curtains were assumed around all other dredging/capping areas for each alternative.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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Table 6. Temporary Sheetpile Walls

ESTIMATE WORKSHEET 5.2

Temp. Sheet Pile Walls

BID DATE	PROJECT LOCATION	DESCRIPTION OF ITEM	ITEM NO.
			5.2

				PRODUCTION DATA				
				HOURS PER SHIFT	SHIFTS PER DAY	DAYS PER WEEK	DAILY UNIT PRODUCTION RATE	DAYS REQ. TO COMPLETE
TOTAL QUANTITY ON PROPOSAL	14 LF	3 pairs per day						
QUANTITY		Assume sheets 80'		10	1	6	14	1
ESTIMATE WORKSHEET		TOTAL LABOR	TOTAL MATERIAL	TOTAL EQUIPMENT	TOTAL RENTED EQUIPMENT		TOTAL SUB-CONTRACTOR	TOTAL
WORKSHEET 5.2		$4,800.00	$1,756.51		$5,130.00		$14,675.28	$26,362
								$0
								$0
								$0
GRAND TOTALS		$4,800.00	$1,756.51	$0.00	$5,130.00		$14,675.28	$26,362
UNIT PRICES		$355.56	$130.11	$0.00	$380.00		$1,087.06	

SUB-CONTRACTOR	WORK TO PERFORM	QUANTITY UNITS	UNIT COST		TOTAL COST				
Purchase and deliver steel sheets		14	$1,082		$14,601			UNIT PRICE	$1,953
Remove sheet pile wall		14	$433		$5,843			UNIT OF MEASURE	LF
Salvage Cost		14	-$427		-$5,769			OH&P 25%	$2,440
					$0				
					$0				
					$0				
BARE UNIT COST	$1,087.06	TOTAL COST			$14,675.28				

LABOR CLASSIFICATION	WORK TO PERFORM	TOTAL MEN	TOTAL HOURS	HRLY RATE	TOTAL COST	OWN EQUIPMENT	WORK TO PERFORM	FUEL GALS.	TOTAL UNITS	TOTAL HOURS	HRLY RATE	TOTAL COST
Laborer		8	10	$37.00	$2,960.00			0		0	$0.00	$0.00
Operator		4	10	$46.00	$1,840.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
17% OT			0		$0.00			0		0	$0.00	$0.00
BARE UNIT COST	$0.00	TOTAL LABOR COST			$4,800.00	BARE UNIT COS	$0.00	0		TOTAL SES COST		$0.00

MATERIAL / SERVICES		QUANTITY UNITS	UNIT COST		TOTAL COST	RENTAL EQUIP	WORK TO PERFORM	FUEL GALS.	TOTAL UNITS	TOTAL HOURS	HRLY RATE	TOTAL COST
Fuel / Oil / Grease		345	$ 4.00	GAL	$1,380.00	150 Ton Crane		120	1	10	$111.00	$1,110.00
Equipment Repairs 7%					$152.60	Barge 200x50		0	1	10	$107.00	$1,070.00
PPE		12	$15.00		$93.80	Tender 200 HP		20	1	10	$16.00	$160.00
					$0.00	Tug 800 HP		150	1	10	$60.00	$600.00
					$0.00	ICE Vibratory		15	1	10	$22.00	$220.00
					$0.00	Air compressor		20	1	10	$47.00	$470.00
					$0.00	Welder/ Torch		20	1	10	$5.00	$50.00
					$0.00	Material Barge		0	1	10	$107.00	$1,070.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
TAX AT 8%					$130.11	TAX AT 8%		0		0	$0.00	$380.00
BARE UNIT COST	$130.11	TOTAL MATERIAL COST			$1,756.51	BARE UNIT COS	$380.00	345		TOTAL RENTED EQUIP		$5,130.00

Table 7. Silt Curtain Installation

ESTIMATE WORKSHEET 5.1												
										SILT CURTAIN INSTALLATION		
BID DATE	PROJECT LOCATION						DESCRIPTION OF ITEM					ITEM NO.
												5.1
						PRODUCTION DATA						
TOTAL QUANTITY ON PROPOSAL	750 LF					HOURS PER SHIFT	SHIFTS PER DAY	DAYS PER WEEK		DAILY UNIT PRODUCTION RATE		DAYS REQ. TO COMPLETE
QUANTITY						10	1	6		750		1
ESTIMATE WORKSHEET		TOTAL LABOR		TOTAL MATERIAL		TOTAL EQUIPMENT	TOTAL RENTED EQUIPMENT			TOTAL SUB-CONTRACTOR		TOTAL
WORKSHEET 5.1			$2,808.00		$44,788.90				$1,252.80		$2,800.00	$51,649.70
												$0.00
												$0.00
												$0.00
GRAND TOTALS			$2,808.00		$44,788.90	$0.00			$1,252.80		$2,800.00	$51,649.70
UNIT PRICES			$3.74		$59.72	$0.00			$1.67		$3.73	
SUB-CONTRACTOR	WORK TO PERFORM	QUANTITY UNITS	UNIT COST		TOTAL COST					UNIT PRICE		$68.87
										UNIT OF MEASURE		LF
IWT Delivery		1	$2,800.00		$2,800.00					OH&P	25%	$86
					$0.00							
					$0.00							
					$0.00							
					$0.00							
					$0.00							
BARE UNIT COST	$0.00	TOTAL COST			$2,800.00							
LABOR CLASSIFICATION	WORK TO PERFORM	TOTAL MEN	TOTAL HOURS	HRLY RATE	TOTAL COST	OWN EQUIPMENT	WORK TO PERFORM	FUEL GALS.	TOTAL UNITS	TOTAL HOURS	HRLY RATE	TOTAL COST
Laborer		4	10	$37.00	$1,480.00			0		0	$0.00	$0.00
Operator		2	10	$46.00	$920.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
			0	$0.00	$0.00			0		0	$0.00	$0.00
17% OT			0		$408.00			0		0	$0.00	$0.00
BARE UNIT COST	$0.00	TOTAL LABOR COST			$2,808.00	BARE UNIT COST	$0.00	0		TOTAL SES COST		$0.00
MATERIAL / SERVICES		QUANTITY UNITS	UNIT COST		TOTAL COST	RENTAL EQUIP	WORK TO PERFORM	FUEL GALS.	TOTAL UNITS	TOTAL HOURS	HRLY RATE	TOTAL COST
FOG	GAL	45	$4.00		$180.00	Work Boat		15	2	10	$56.00	$1,120.00
Equipment Repair	7%	1	$81.20		$81.20	Forklift		30	1	2.5	$16.00	$40.00
PPE		6	$15.00		$90.00			0		0	$0.00	$0.00
Turbidity Curtains		800	$51.40		$41,120.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
					$0.00			0		0	$0.00	$0.00
TAX AT 8%					$3,317.70	TAX AT 8%		0		0	$0.00	$92.80
BARE UNIT COST	$59.72	TOTAL MATERIAL COST			$44,788.90	BARE UNIT COST	$1.67	45		TOTAL RENTED EQUIP		$1,252.80

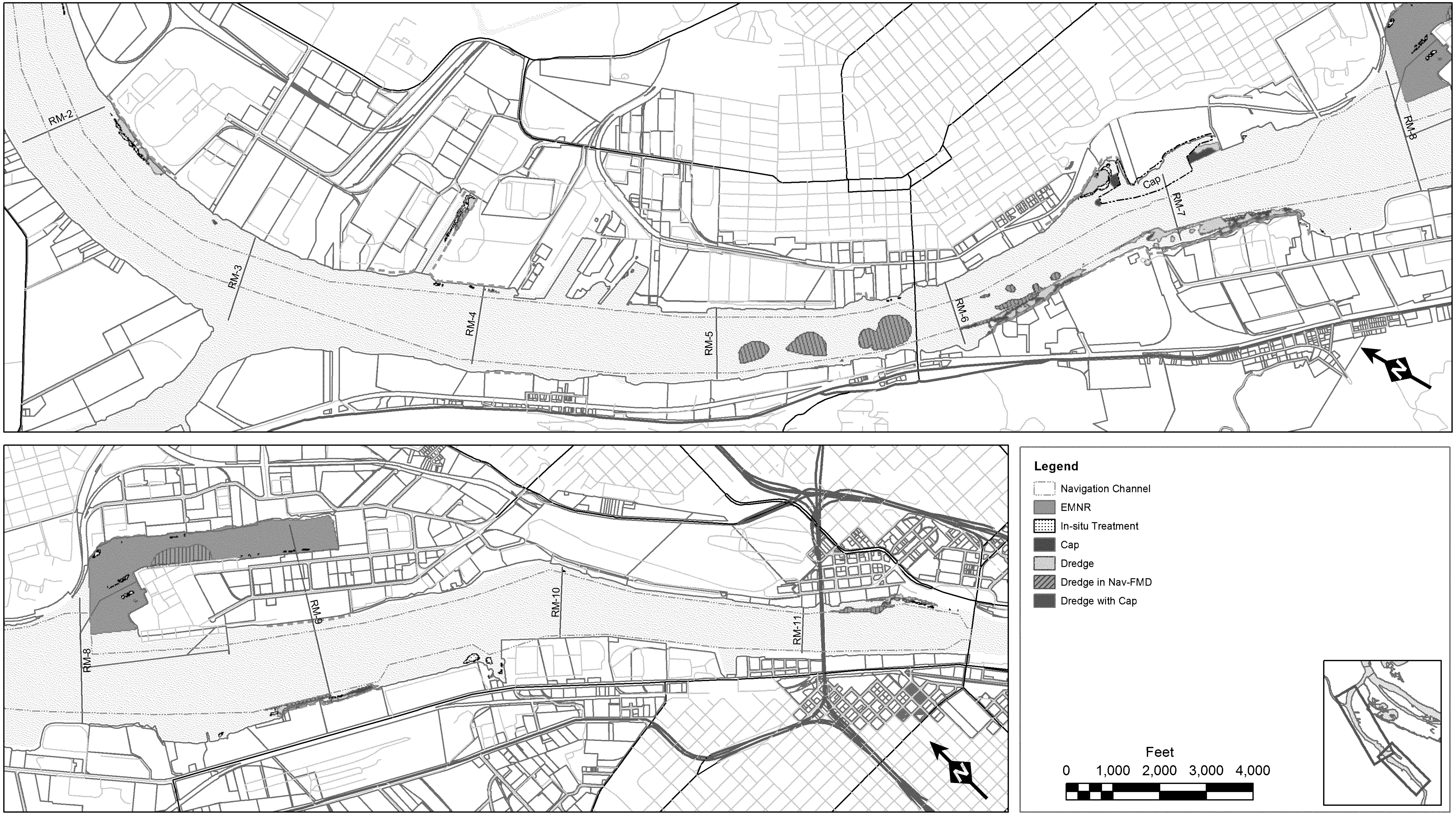
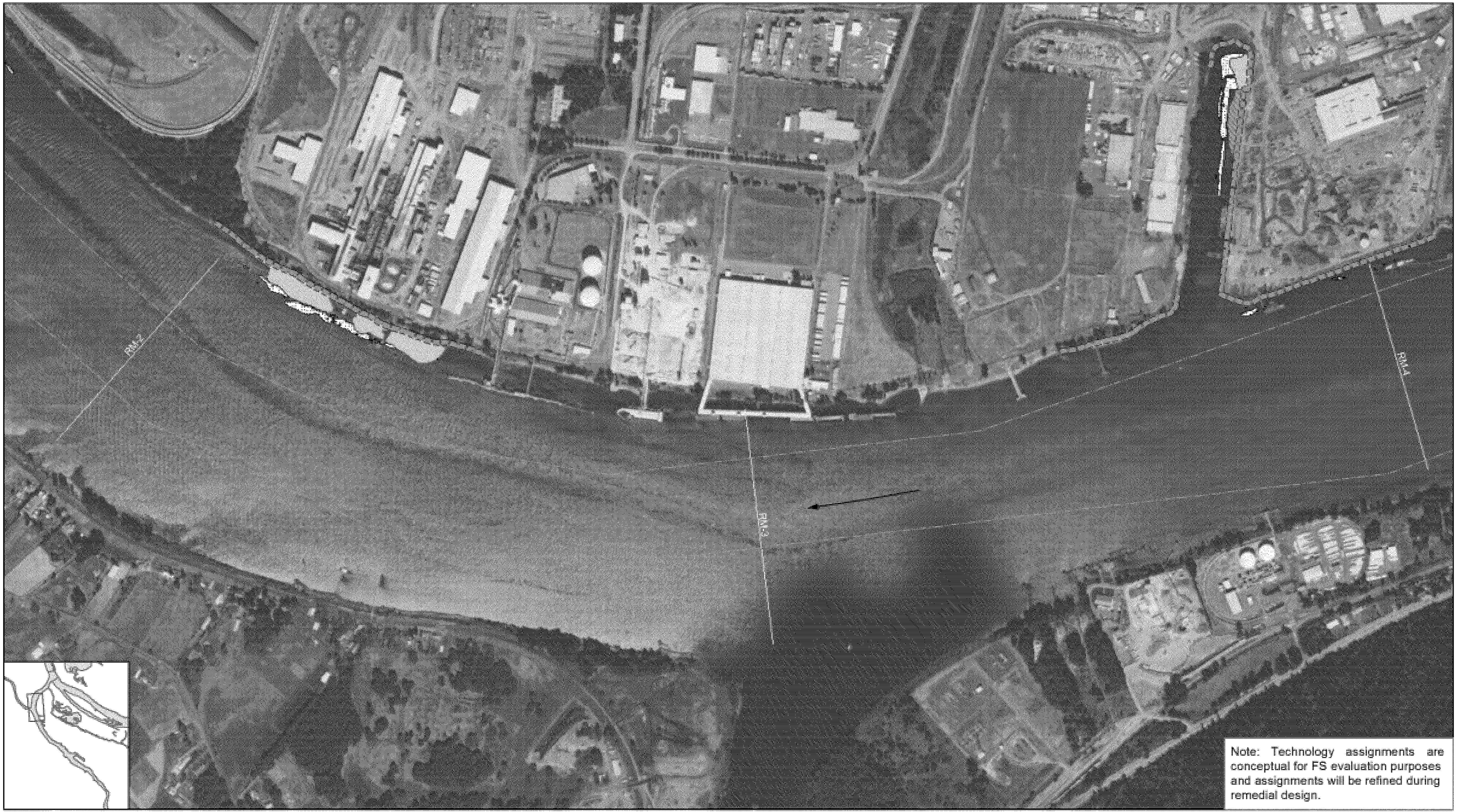


Figure 3.6-2a. Technology Assignments, Alternative B, Site-Wide

PRELIMINARY DRAFT
For Discussion Purposes Only
Not for Distribution

Date: 7/17/2015



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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-2b.
Technology Assignments
Alternative B
Rivermile 1.9 to 4

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-2c.
Technology Assignments
Alternative B
Rivermile 4 to 6

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-2d.
Technology Assignments
Alternative B
Rivermile 6 to 8

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-2e.
Technology Assignments
Alternative B
Rivermile 8 to 10

N

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-2f.
Technology Assignments
Alternative B
Rivermile 10 to 12

N

0 500 1,000
Feet

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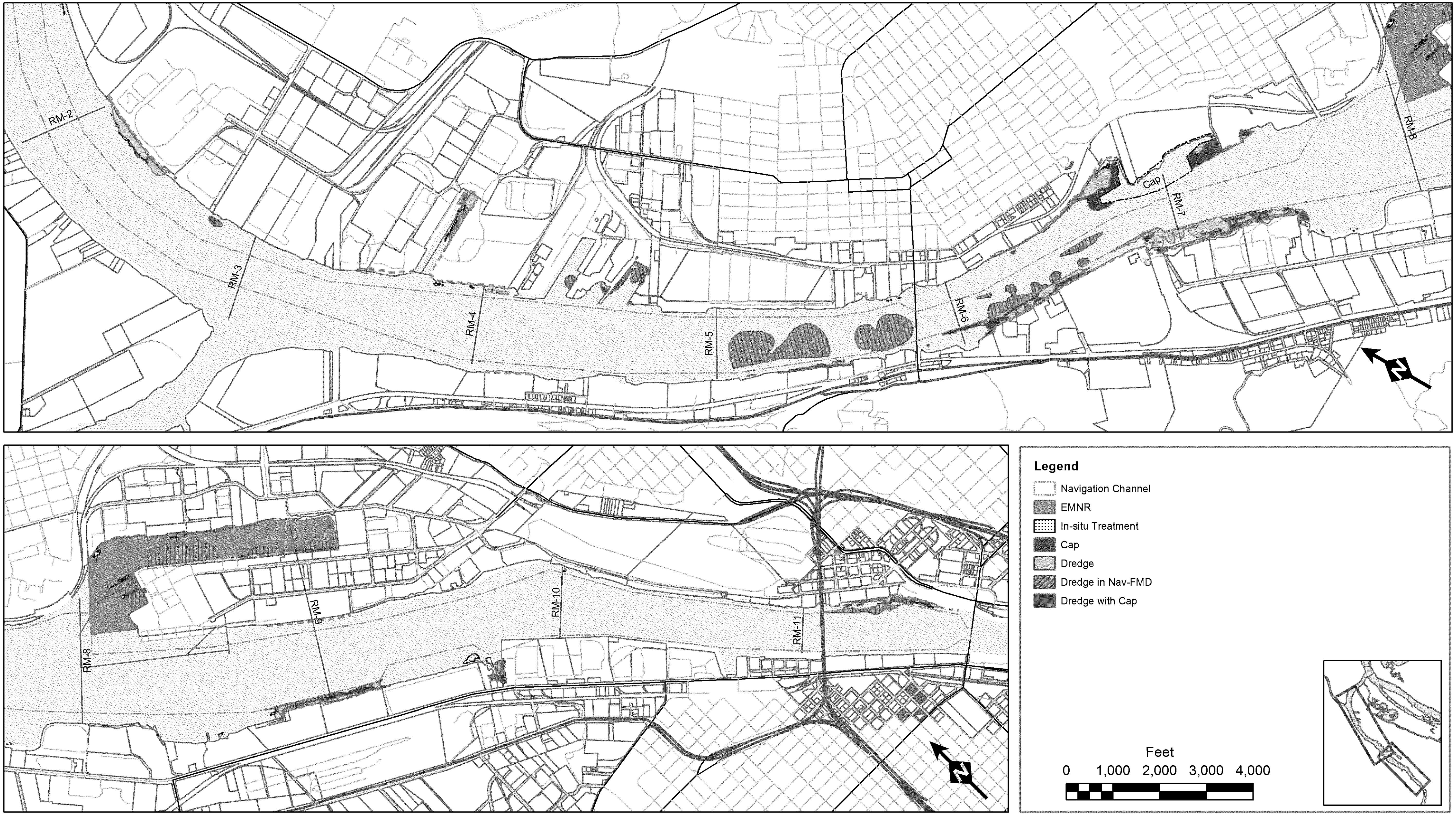

Figure 3.6-4a. Technology Assignments, Alternative D, Site-Wide

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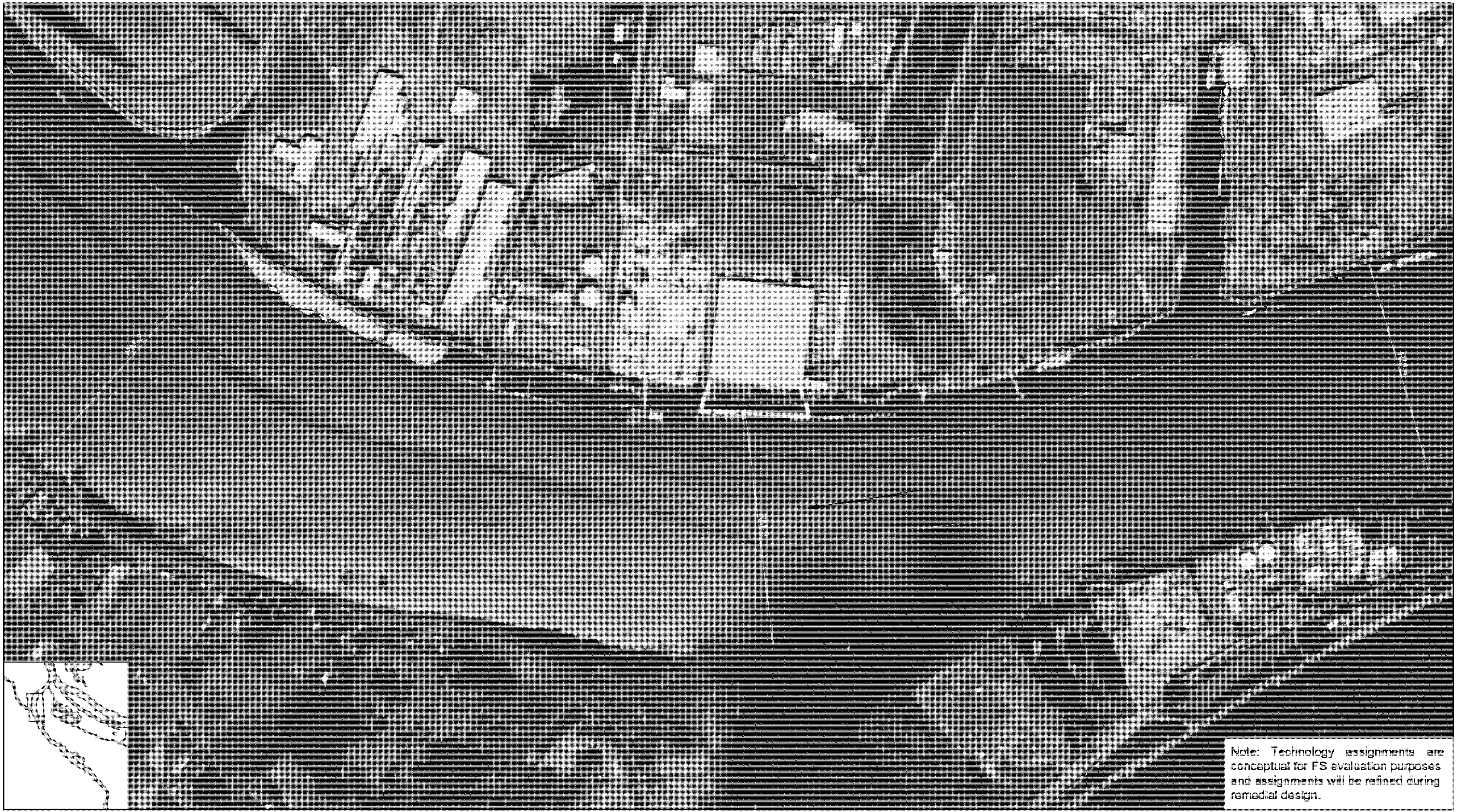

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-4b.
Technology Assignments
Alternative D
Rivermile 1.9 to 4

0 500 1,000
Feet

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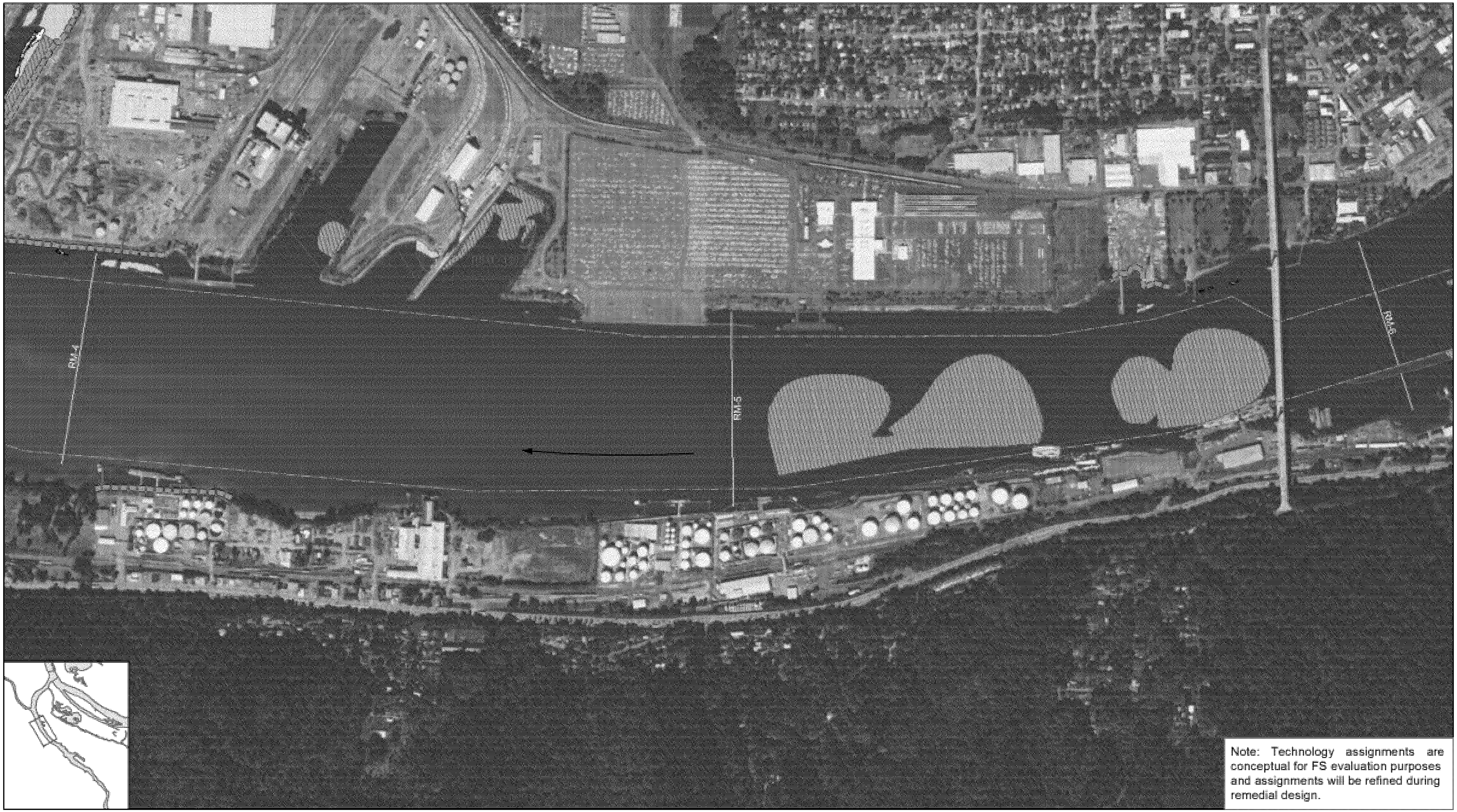

Source Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-4c.
Technology Assignments
Alternative D
Rivermile 4 to 6

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-4d.
Technology Assignments
Alternative D
Rivermile 6 to 8

0 500 1,000
Feet

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- Properties with Known Contaminated Riverbanks
- River Flow
- Navigation Channel
- EMNR
- In-situ Treatment
- Cap
- Dredge
- Dredge in Nav-FMD
- Dredge with Cap

Figure 3.6-4e.
Technology Assignments
Alternative D
Rivermile 8 to 10

N

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-4f.
Technology Assignments
Alternative D
Rivermile 10 to 12

0 500 1,000
Feet

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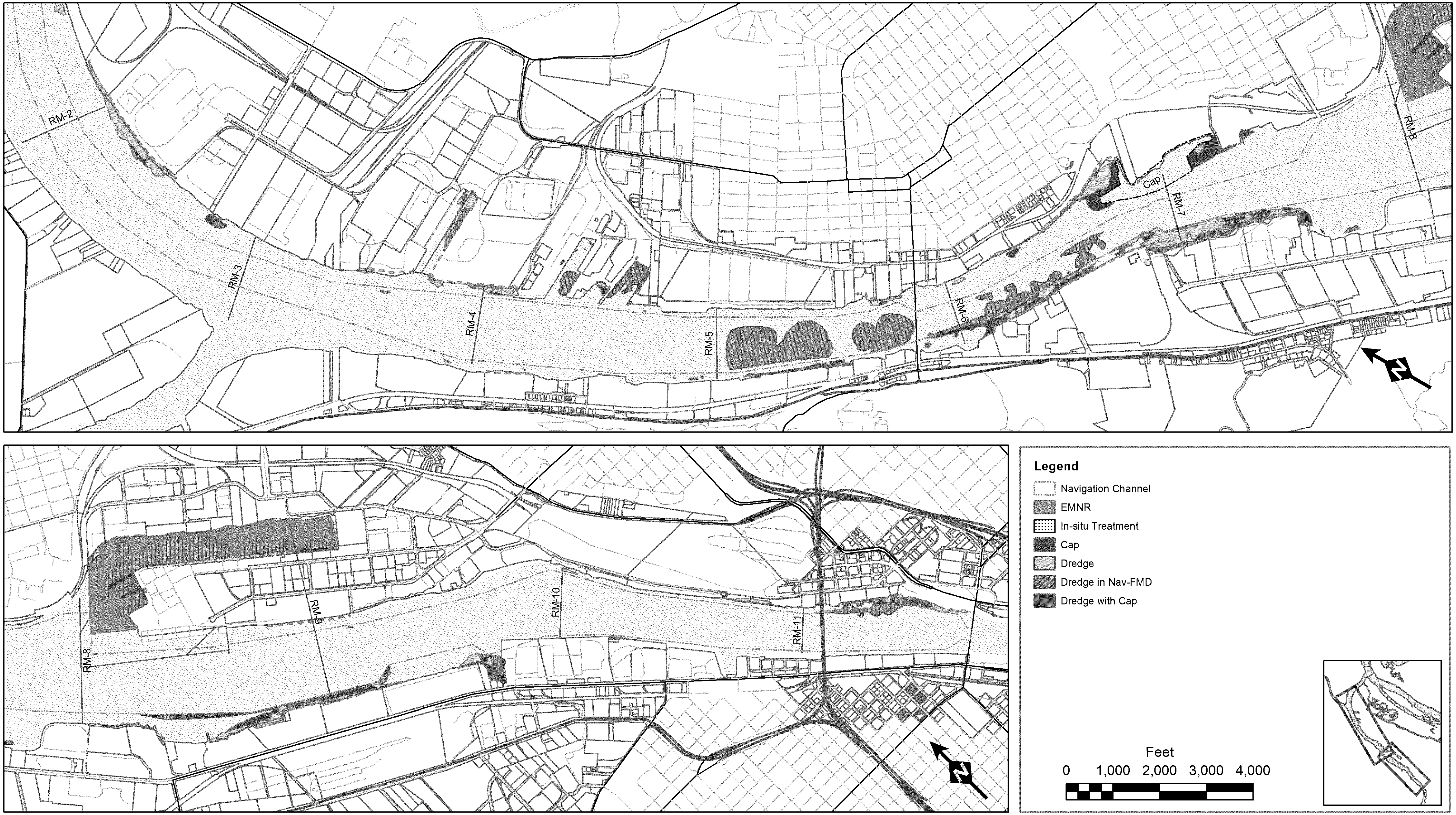

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Figure 3.6-5a. Technology Assignments, Alternative E, Site-Wide

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Date: 7/17/2015

Figure 3.6-5b.
Technology Assignments
Alternative E
Rivermile 1.9 to 4

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-5c.
Technology Assignments
Alternative E
Rivermile 4 to 6

0 500 1,000
Feet

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- Properties with Known Contaminated Riverbanks
- River Flow
- Navigation Channel
- EMNR
- In-situ Treatment
- Cap
- Dredge
- Dredge in Nav-FMD
- Dredge with Cap

Figure 3.6-5d.
Technology Assignments
Alternative E
Rivermile 6 to 8

0 500 1,000
Feet

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- Properties with Known Contaminated Riverbanks
- River Flow
- Navigation Channel
- EMNR
- In-situ Treatment
- Cap
- Dredge
- Dredge in Nav-FMD
- Dredge with Cap

Figure 3.6-5e.
Technology Assignments
Alternative E
Rivermile 8 to 10

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-5f.
Technology Assignments
Alternative E
Rivermile 10 to 12

0 500 1,000
Feet

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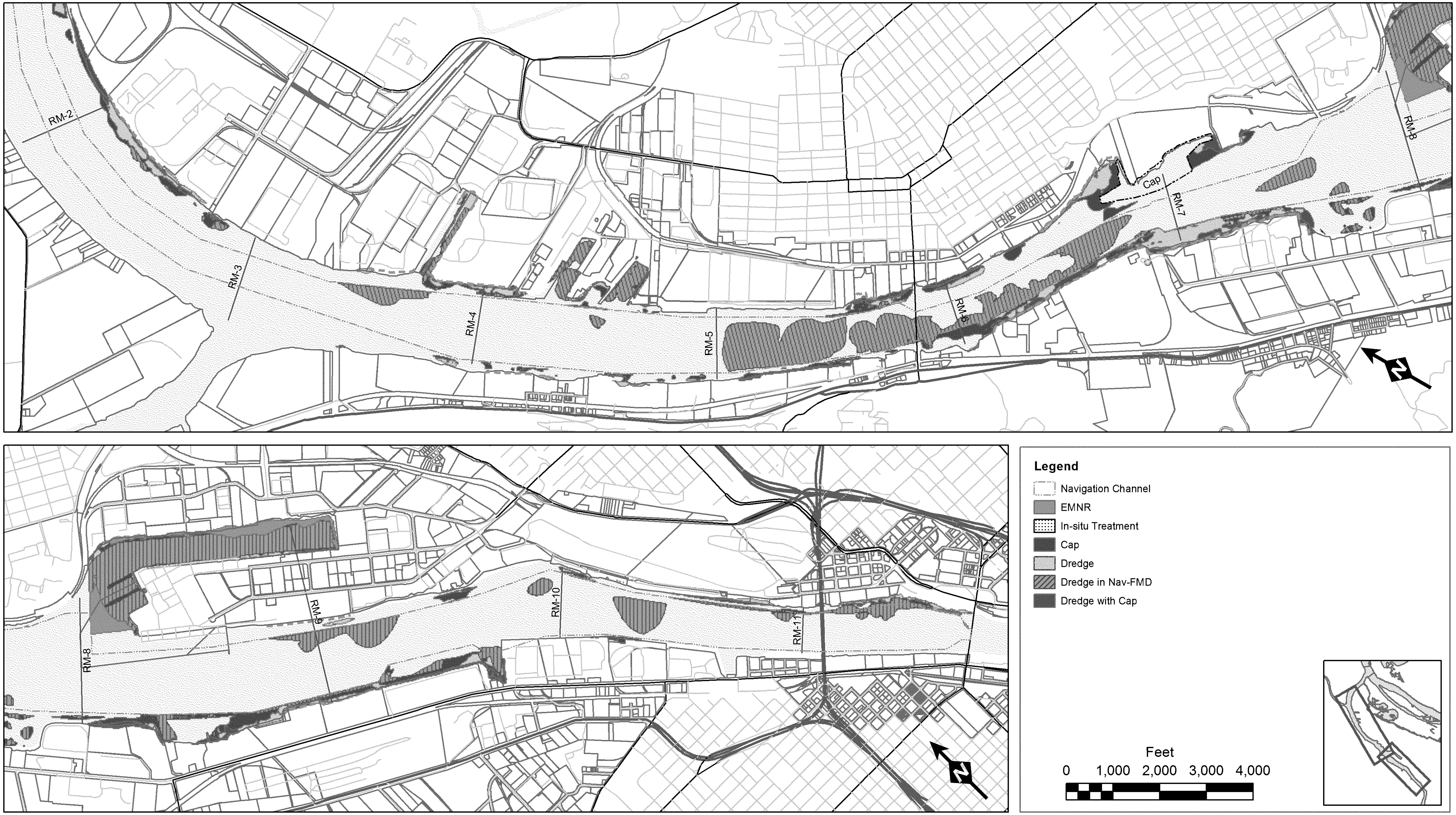

Figure 3.6-6a. Technology Assignments, Alternative F, Site-Wide

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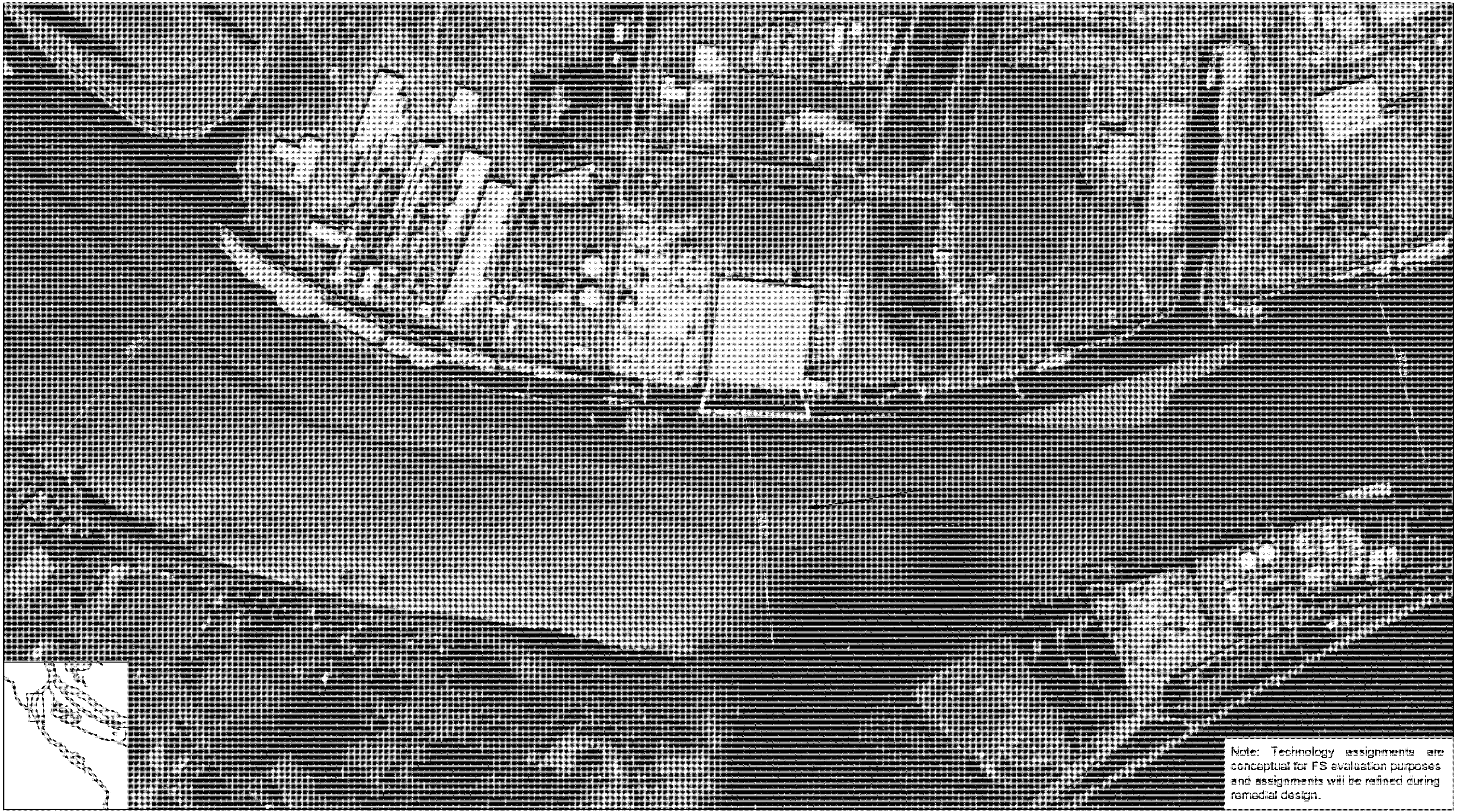

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-6b.
Technology Assignments
Alternative F
Rivermile 1.9 to 4

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-6c.
Technology Assignments
Alternative F
Rivermile 4 to 6

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-6d.
Technology Assignments
Alternative F
Rivermile 6 to 8

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-6e.
Technology Assignments
Alternative F
Rivermile 8 to 10

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-6f.
Technology Assignments
Alternative F
Rivermile 10 to 12

0 500 1,000
Feet

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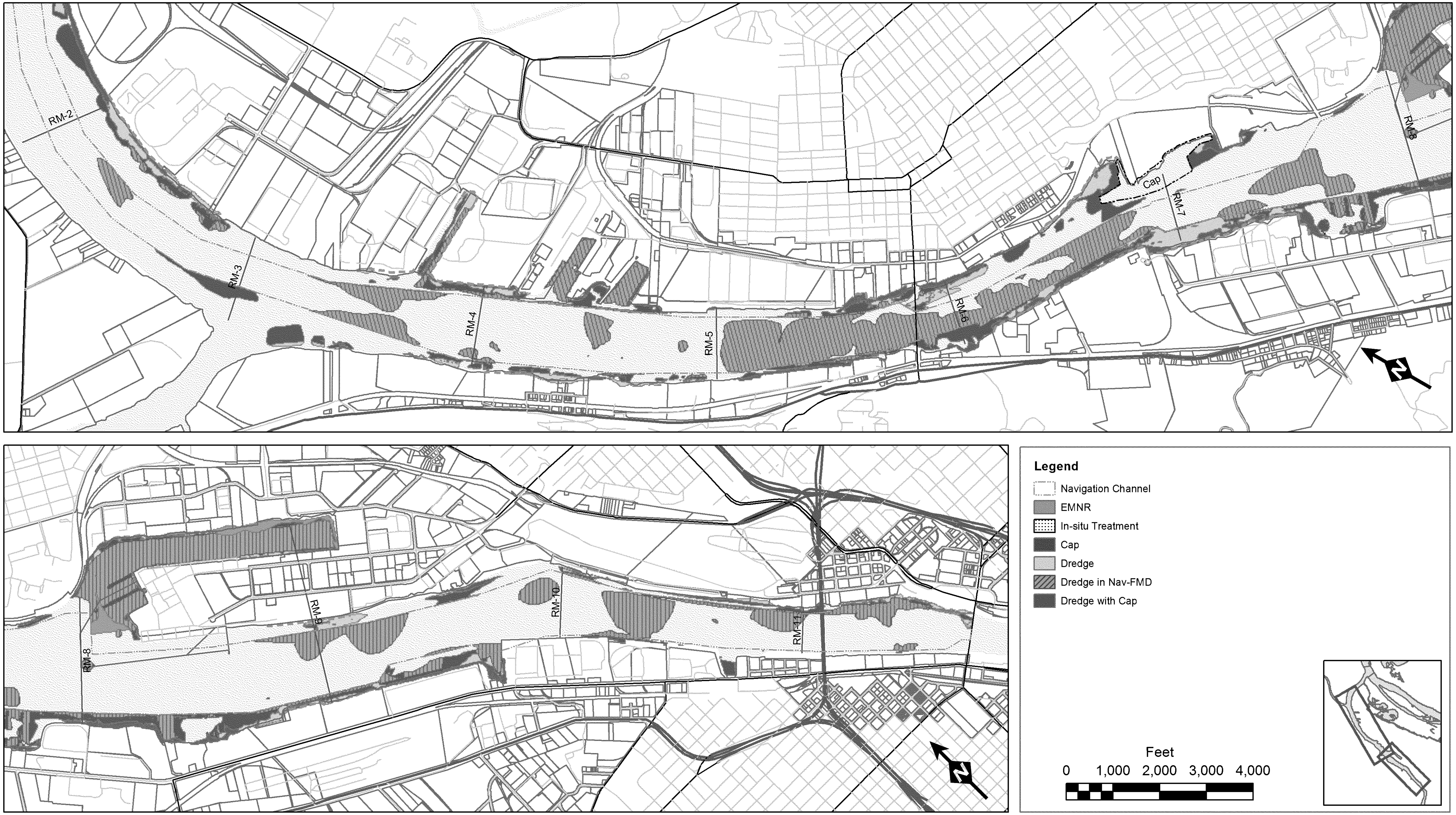

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Figure 3.6-7a. Technology Assignments, Alternative G, Site-Wide

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Date: 7/17/2015

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-7b.
Technology Assignments
Alternative G
Rivermile 1.9 to 4

0 500 1,000
Feet

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- Properties with Known Contaminated Riverbanks
- River Flow
- Navigation Channel
- EMNR
- In-situ Treatment
- Cap
- Dredge
- Dredge in Nav-FMD
- Dredge with Cap

Figure 3.6-7c.
Technology Assignments
Alternative G
Rivermile 4 to 6

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-7d.
Technology Assignments
Alternative G
Rivermile 6 to 8

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-7e.
Technology Assignments
Alternative G
Rivermile 8 to 10

0 500 1,000
Feet

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Properties with Known Contaminated Riverbanks
River Flow
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap

Figure 3.6-7f.
Technology Assignments
Alternative G
Rivermile 10 to 12

0 500 1,000
Feet

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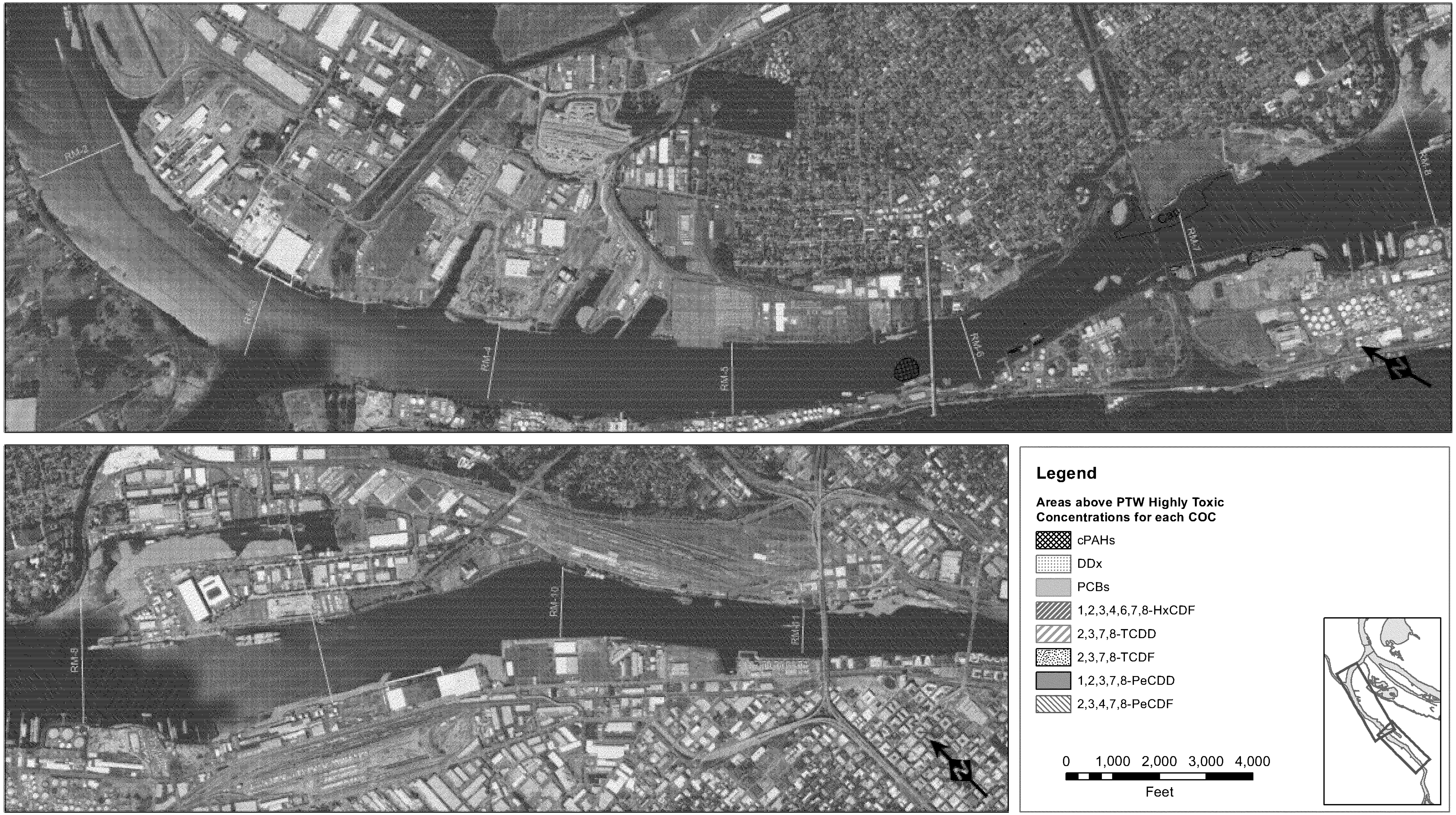

Source Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 3.2-5. Highly Toxic PTW Contours (Surface Sediment)

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Date: 7/14/2015

CDM Smith

PROJECT:	Portland Harbor FS	COMPUTED BY :	JN
JOB NO.:	79171.3383.345.FSZ	DATE :	9/14/2015
CLIENT:	EPA	CHECKED BY:	ARB
		WRKSHT NO. :	QTY-16

	Length of Silt Curtain By Rivermile Section (LF)				
	Alt B	**Alt D**	**Alt E**	**Alt F**	**Alt G**
Rivermile 1.9 to 4	2333	2654	3662	7032	7355
	303	1248	1331	914	3653
		833	758	2556	3297
		329	1165	1159	1979
		1244			
Rivermile 4 to 6		470	1576	465	3455
		353	564	2927	4502
		680	391	3783	10785
		2287	624	2384	
			3289	3019	
			1602	3202	
				1903	
Rivermile 6 to 8	3514	3863	962	4237	5227
	1748	2549	4023	2642	2557
	1585	3558	2507	898	1549
			1358	3073	479
			2635	3199	2869
					3098
Rivermile 8 to 10	1264	1259	1275	1285	1192
	2983	3186	7215	1349	2225
		1118	1523	1591	2451
			805	938	998
				8537	8669
Rivermile 10 to 12	2572	2874	1412	525	524
			3683	6860	6985
				1447	2196
					498
Total	**16,302**	**28,505**	**42,360**	**65,925**	**76,543**

	Length of Silt Curtains by River Section				
River Section	**Alt B**	**Alt D**	**Alt E**	**Alt F**	**Alt G**
Rivermile 1.9 to 4	2,636	6,308	6,916	11,661	16,284
Rivermile 4 to 6	0	3,790	8,046	17,683	18,742
Rivermile 6 to 8	6,847	9,970	11,485	14,049	15,779
Rivermile 8 to 10	4,247	5,563	10,818	13,700	15,535
Rivermile 10 to 12	2,572	2,874	5,095	8,832	10,203

Total Silt Curtain Length (LF)	**17,500**	**30,000**	**42,500**	**67,500**	**77,500**

Note: Total is rounded up to nearest 2,500

CDM Smith

PROJECT:	Portland Harbor FS	COMPUTED BY :	JN
JOB NO.:	79171.3383.345.FSZ	DATE :	9/14/2015
CLIENT:	EPA	CHECKED BY:	ARB
		WRKSHT NO. :	QTY-17

	Length of Sheet Pile by Area (LF)				
Area	**Alt B**	**Alt D**	**Alt E**	**Alt F**	**Alt G**
Rivermile 6 to 8	5,000	5,000	5,000	5,000	5,000
	2,500	2,500	2,500	2,500	2,500

Total Sheet Pile Length (LF)	**7,500**	**7,500**	**7,500**	**7,500**	**7,500**

To: Koch, Kristine[Koch.Kristine@epa.gov]
Cc: Patty Dost[pdost@pearllegalgroup.com]; ldunn@riddellwilliams.com[ldunn@riddellwilliams.com]; Amanda Shellenberger[ashellenberger@anchorqea.com]; Jen Woronets[jworonets@anchorqea.com]; Bob Wyatt[rjw@nwnatural.com]; James McKenna[jim.mckenna@verdantllc.com]; Cora, Lori[Cora.Lori@epa.gov]
From: Carl Stivers
Sent: Mon 11/23/2015 6:45:43 PM
Subject: RE: [External]RE: Draft Prioritization of Information Requests on FS Sections 3 and 4
2015-09-08 Information Requests from EPA.pdf
2015-09-08 LWG Letter to EPA re Information Requests.pdf

Kristine – To help prepare for our November 24, 10:30 am conference call on FS Information Requests, below is a list of items that we would like to discuss for the next "wave" of information from EPA. The numbers and summary descriptions of these issues are consistent with our September 8, 2015 original request submittal (reattached here).

Information Needs

- 2 – Explanation of decision tree application outside intermediate areas
- 5 – Explanation of methods and results used to identify groundwater plume areas
- 9 – Maps of different types (as defined by EPA) of PTW
- 10 – Not reliably contained and ex-situ treatment determinations relative to NAPL, PAHs, and DDx
- 12 – Areas and volume of sediments with DDx detections assumed to be subject to the Oregon pesticide rule and related contained in decision point in the disposal decision tree.
- 14 – EPA methods for defining NAPL in Figures 3.3-28 and 29.
- 24 – Riverbank data (in Access or Excel format) used in FS riverbank evaluations
- 25 – Details of sheet piling approach used (e.g., areas enclosed, liner feet, assumed heights, types of sheet piles, evaluations of deep water sheet piling).
- 29 – Explanation of SEDCAM modeling methods and results presented at the July 31 roll out meeting
- 30 – Explanation of the import volume calculations and assumptions for back fill volumes in Table 3.6-3
- 33 – Any additional residual risk figures not presented in Appendix H

- 34 – Explanation of residual risk assessments performed at a "Site-wide scale"

- 36 – Explanation of methods and results of tissue concentrations calculated from SWAC estimates

- 37 – Explanation of data and CSM used to support the statements about the importance of bedload movement on p. 4-3

- 40 – Explanation of why some Section 4 dioxin/furan PRGs are different from the Section 2 PRGs, and which PRGs are correct.

Requests for Corrected Information

- 1 – Correct and consistent versions of Figures 3.3-27, 3.6-02 through 3.6-07, 4.2-11, and 4.2-14 through 4.2-17.

- 4 – Confirmation that dioxin/furan residual risk HQs are correct, and if not, supply the corrected information. Also, if correct, explain why the BHHRA and EPA draft FS HQs are often so different?

Thanks.

Carl

Carl Stivers

ANCHOR QEA, LLC
cstivers@anchorqea.com
23 S. Wenatchee Ave, Suite 220
Wenatchee, WA 98801
Phone: 509.888.2070

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 11/23/2015 5:57:33 PM
Subject: FW: Draft Sediment Recontamination Definition
Sediment Recontamination DefinitionNov20.docx

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: MCCLINCY Matt [mailto:MCCLINCY.Matt@deq.state.or.us]
Sent: Monday, November 23, 2015 9:42 AM
To: Koch, Kristine <Koch.Kristine@epa.gov>
Cc: LIVERMAN Alex <liverman.alex@deq.state.or.us>; PARRETT Kevin <Parrett.Kevin@deq.state.or.us>; JOHNSON Keith <JOHNSON.Keith@deq.state.or.us>; DeMaria, Eva <DeMaria.Eva@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Robinson, Deborah <Robinson.Deborah@epa.gov>; ROICK Tom <ROICK.Tom@deq.state.or.us>
Subject: Draft Sediment Recontamination Definition

Hi Kristine,

Good job at the NRRB last week. Hopefully day two went well for you and the team. Attached is the draft sediment recontamination definition that we discussed during the recent DEQ/EPA Portland Harbor meeting. As we noted, it is an initial cut at a working definition. Please review and kick it around with your team. We look forward to EPA's thoughts on the draft. Perhaps we can include a discussion of it at the next DEQ/EPA Pdx Harbor meeting.

Matt McClincy

Oregon Department of Environmental Quality

Northwest Region

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Table - List of ARARs for Management of PCBs and PCB Remediation Waste

Action	Requirements	Prerequisite	Citation
Waste Generation and Management			
Management of PCB waste (e.g., contaminated PPE, equipment, wastewater)	Any person storing or disposing of PCB waste must do so in accordance with 40 CFR 761, Subpart D.	Generation of waste containing PCBs at concentrations ≥ 50 ppm – **applicable**	40 CFR 761.50(a)
	Any person cleaning up and disposing of PCBs shall do so based on the concentration at which the PCBs are found.	Generation of PCB remediation waste as defined in 40 CFR 761.3 – **applicable**	40 CFR 761.61
Management of PCB Items	Must dispose of in accordance with 40 CFR 761.60(b) or decontaminate in accordance with 40 CFR 761.79.	Removal from use of a PCB Item containing intact, non-leaking PCB Article – **applicable**	40 CFR 761.50(b)(2)
	Must dispose of as bulk product waste in accordance with 40 CFR 761.62(a) or (c).	Removal from use of a PCB Item where PCB Article is no longer intact and non-leaking – **applicable**	40 CFR 761.50(b)(2)
Management of PCB/Radioactive waste	Any person storing such waste ≥ 50 ppm PCBs must do so taking into account both its PCB concentration and radioactive properties, except as provided in 40 CFR 761.65(a)(1), (b)(1)(ii) and (c)(6)(i).	Generation of PCB/ Radioactive waste for a disposal – **applicable**	40 CFR 761.50(b)(7)(i)
	Any person disposing of such waste must do so taking into account both its PCB concentration and its radioactive properties.		40 CFR 761.50(b)(7)(ii)
	If, after taking into account only the PCB properties in the waste, the waste meets the requirements for disposal in a facility permitted, licensed, or registered by a state as a municipal or non-municipal non-hazardous waste landfill, e.g., PCB bulk product waste under 40 CFR 761.62(b)(1), then the person may dispose of such waste without regard to the PCBs, based on its radioactive properties alone in accordance with applicable requirements.		

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Action	Requirements	Prerequisite	Citation
	Storage		
Temporary storage of PCB waste (e.g., PPE, rags) in a container(s)	Container(s) shall be marked as illustrated in 40 CFR 761.45(a).	Storage of PCBs and PCB Items at concentrations ≥ 50 ppm for disposal – **applicable**	40 CFR 761.40(a)(1)
	Storage area must be properly marked as required by 40 CFR 761.40(a)(10).		40 CFR 761.65(c)(3)
	Any leaking PCB Items and their contents shall be transferred immediately to a properly marked non-leaking container(s).		40 CFR 761.65(c)(5)
	Container(s) shall be in accordance with requirements set forth in DOT HMR at 49 CFR 171-180.		40 CFR 761.65(c)(6)
Storage of PCB waste and/or PCB/radioactive waste in non-RCRA regulated unit	Storage facility must have or be: • Adequate roof and walls to prevent rainwater from reaching stored PCBs and PCB items;	Storage of PCBs and PCB Items at concentrations ≥ 50 ppm for disposal – **applicable**	40 CFR 761.65(b)(1) 40 CFR 761.65(b)(1)(i)
	• Adequate floor that has continuous curbing with a minimum 6-inch high curb. Floor and curb must provide a containment volume equal to at least two times the internal volume of the largest PCB article or container or 25% of the internal volume of all articles or containers stored there, whichever is greater. *Note*: 6 inch minimum curbing not required for area storing PCB/radioactive waste;	Storage of PCB/radioactive waste as defined in 40 CFR 761.3 – **applicable**	40 CFR 761.65(b)(1)(ii)
	• No drain valves, floor drains, expansion joints, sewer lines, or other openings that would permit liquids to flow from curbed area;		40 CFR 761.65(b)(1)(iii)
	• Floors and curbing constructed of Portland cement, concrete, or a continuous, smooth, non-porous surface that prevents or minimizes penetration of PCBs; and		40 CFR 761.65(b)(1)(iv)
	• Not located at a site that is below the 100-year flood water elevation.		40 CFR 761.65(b)(1)(v)
	Storage area must be properly marked as required by 40 CFR 761.40(a)(10).		40 CFR 761.65(c)(3)

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Storage of PCB waste and/or PCB/radioactive waste in a RCRA-regulated container storage area	Does not have to meet storage unit requirements in 40 CFR 761.65(b)(1) provided unit: • is permitted by EPA under RCRA §3004, or • qualifies for interim status under RCRA §3005; or • is permitted by an authorized state under RCRA §3006 and, • PCB spills cleaned up in accordance with Subpart G of 40 CFR 761.	Storage of PCBs and PCB Items designated for disposal – **applicable**	40 CFR 761.65(b)(2)(i)-(iv)
Storage of PCB/radioactive waste in containers	For liquid wastes, containers must be nonleaking. For non-liquid wastes, containers must be designed to prevent buildup of liquids if such containers are stored in an area meeting the containment requirements of 40 CFR 761.65(b)(1)(ii); and	Storage of PCB/radioactive waste in containers other than those meeting DOT HMR performance standards – **applicable**	40 CFR 761.65(c)(6)(i)(A) 40 CFR 761.65(c)(6(i)(B)
	For both liquid and non-liquid wastes, containers must meet all regulations and requirements pertaining to nuclear criticality safety.		40 CFR 761.65(c)(6)(i)(C)
Temporary storage of bulk PCB remediation waste or PCB bulk product waste in a waste pile	Waste must be placed in a pile that: • is designed and operated to control dispersal by wind, where necessary, by means other than wetting; • does not generate leachate through decomposition or other reactions.	Storage of PCB remediation waste or PCB bulk product waste at cleanup site or site of generation for up to 180 days – **applicable**	40 CFR 761.65(c)(9)(i) and (ii)
Waste pile liner performance	The storage site must have a liner designed, constructed, and installed to prevent any migration of wastes off or through liner into adjacent subsurface soil, groundwater or surface water at any time time during active life(including closure period) of the storage site.		40 CFR 761.65(c)(9)(iii)(A)
Construction of storage pile liner	Liner must be: • constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure because of pressure gradients, physical contact with waste or leachate to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation; • placed on foundation or base capable of providing support to liner and resistance to pressure gradients above and below the liner to present failure because of settlement compression or uplift; • installed to cover all surrounding earth likely to be in contact with waste.	Storage of PCB remediation waste or PCB bulk product waste at cleanup site or site of generation for up to 180 days – **applicable**	40 CFR 761.65(c)(9)(iii)(A)(*1*)-(*3*)

Construction of storage pile cover	The storage site must have a cover that: • meets the requirements of 40 CFR 761.65(c)(9)(iii)(A); • is installed to cover all of the stored waste likely to be contacted by precipitation; and • is secured so as not to be functionally disabled by winds expected under normal weather conditions; and		40 CFR 761.65(c)(9)(iii)(B)
Construction of storage pile run-on control system	The storage site must have a run-on control system designed, constructed, operated and maintained such that it: • prevents flow on the stored waste during peak discharge from at least a 25-year storm; • collects and controls at least the water volume resulting from a 24-hour, 25-year storm. Collection and holding facilities (e.g., tanks or basins) must be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system.		40 CFR 761.65(c)(9)(iii)(C) (*1*) and (*2*)
Modification of waste pile requirements	Requirements of 40 CFR 761.65(c)(9) may be modified under the risk-based disposal option of 40 CFR 761.61(c).		40 CFR 761.65(c)(9)(iv)
Clean closure of TSCA storage facility	A TSCA/RCRA storage facility closed under RCRA is exempt from the TSCA closure requirements of 40 CFR 761.65(e).	Closure of TSCA/RCRA storage facility – **applicable**	40 CFR 761.65(e)(3)
Treatment and Disposal			
Disposal of PCB Capacitor(s)	Shall comply with all requirements of 40 CFR 761.60 unless it is known from label or nameplate information, manufacturer's literature, or chemical analysis that the capacitor does not contain PCBs.	Generation of PCB Capacitors with ≥ 500 ppm PCBs for disposal – **applicable**	40 CFR 761.60(b)(2)(i)
	Any person must assume that a capacitor manufactured prior to July 2, 1979, whose PCB concentration is not established, contains ≥ 500 ppm PCBs. If the date of manufacture is unknown, any person must assume the capacitor contains ≥ 500 ppm PCBs.		40 CFR 761.2(a)(4)
	May dispose of in a municipal solid waste landfill unless that person is subject to requirements of 40 CFR 761.60(b)(2)(iv).	Generation of PCB Small Capacitors (as defined in 40 CFR 761.3) for disposal – **applicable**	40 CFR 761.60(b)(2)(ii)
	Shall dispose of in accordance with either of the following: • disposal in an incinerator that complies with 40 CFR 761.70; or • until March 1, 1981, disposal in a chemical waste landfill that complies with 40 CFR 761.75.	PCB Large Capacitor which contains 500 ppm or greater PCBs – **applicable**	40 CFR 761.60(b)(2)(iii)

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Disposal of fluorescent light ballasts	Must be disposed of in a TSCA-approved disposal facility, as bulk product waste under 40 CFR 761.62, or in accordance with the decontamination provisions of 40 CFR 761.79.	Generation of fluorescent light ballasts containing PCBs in the potting material for disposal **– applicable**	40 CFR 761.60(b)(6)(iii)
Disposal of PCB-Contaminated Articles	Must remove all free-flowing liquid from the Article, disposing of the liquid in compliance with the requirements of 40 CFR 761.60(a)(2) or (a)(3); and	Generation of PCB-Contaminated Articles (as defined in 40 CFR 761.3) for disposal **– applicable**	40 CFR 761.60(b)(6)(ii)
Disposal of PCB-Contaminated Articles *con't*	Dispose by one of the following methods: • in accordance with the decontamination provisions at 40 CFR 761.79; • in a facility permitted, licensed, or registered by a State to manage municipal solid waste or non-municipal non-hazardous waste; • in an industrial furnace operating in compliance with 40 CFR 761.72; or • in a disposal facility approved under this part.	Disposal of PCB-Contaminated Articles with no free-flowing liquid **– applicable**	40 CFR 761.60(b)(6)(ii) 40 CFR 761.60(b)(6)(ii)(A)-(D)
Disposal of PCB hydraulic machine	Shall dispose of by one of the following methods: • in accordance with the decontamination provisions at 40 CFR 761.79; • in a facility permitted, licensed, or registered by a State to manage municipal solid waste or non-municipal non-hazardous waste; • in an industrial furnace operating in compliance with 40 CFR 761.72; or • in a disposal facility approved under this part.	Generation of a PCB hydraulic machine containing PCBs ≥ 50 ppm for disposal **– applicable**	40 CFR 761.60(b)(3)(i) 40 CFR 761.60(b)(3)(i)(A)-(D)
	Must remove all free-flowing liquid from the machine, and dispose of the liquid in accordance with the provisions of 40 CFR 761.60(a);		40 CFR 761.60(b)(3)(ii)
	If the PCB liquid contains ≥ 1000 ppm PCB, then the hydraulic machine must be decontaminated in accordance with 40 CFR 761.79 or flushed prior to disposal with a solvent listed at 40 CFR 761.61(b)(1)(i)(B) which contains < 50 ppm PCB.		
Disposal of PCB-Contaminated Electrical Equipment (except capacitors)	Shall dispose in accordance with 40 CFR 761.60(b)(6)(ii)(A).	Generation of PCB Contaminated Electrical Equipment (as defined in 40 CFR 761.3) for disposal **– applicable**	40 CFR 761.60(b)(4)

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Disposal of PCB-Contaminated Electrical Equipment (except capacitors) *con't*	Must remove all free-flowing liquid from the electrical equipment and dispose of the removed liquid in accordance with 40 CFR 760.61(a). Dispose of by one of the following methods: • in accordance with 761.79; • in a facility permitted, licensed, or registered by a State to manage municipal solid waste or non-municipal non-hazardous waste subject to 40 CFR 257.5 thru 257.30, as applicable (excluding thermal treatment units), • in a scrap metal recovery oven or smelter operated in compliance with 40 CFR761.72, or • in a disposal facility approved under this part.	Drained PCB-Contaminated Electrical Equipment (including any residual liquids) **– applicable**	40 CFR 761.60(b)(6)(ii)(A)
	Shall dispose of in one of the following disposal facilities approved under this part; • incinerator under 40 CFR 761.70; • chemical waste landfill under 40 CFR 761.75; • high efficiency boiler under 40 CFR 761.71; or • scrap metal recovery oven or smelter under 40 CFR 761.72.	Disposal of Large Capacitors that contain ≥ 50 ppm but <*500 ppm PCBs **– applicable**	40 CFR 761.60(b)(4)(ii)
Disposal of decontamination waste and residues	Such waste shall be disposed of at their existing PCB concentration unless otherwise specified in 40 CFR 761.79(g)(1 - 6).	Decontamination waste and residues **– applicable**	40 CFR 761.79(g)
	Are regulated for disposal as PCB remediation waste.	Distillation bottoms or residues and filter media **– applicable**	40 CFR 761.79(g)(1)
	Are regulated for disposal at their original concentration.	PCBs physically separated from regulated waste during decontamination, other than distillation bottoms and filter media **– applicable**	40 CFR 761.79(g)(2)
Disposal of decontamination waste and residues *con't*	Must be burned and marketed in accordance with used oil requirements in 40 CFR 761.20(e), or disposed of in accordance with 40 CFR 761.60(a) or (e), or decontaminated pursuant to the section.	Hydrocarbon solvent used or reused for decontamination that contains < 50 ppm PCBs **– applicable**	40 CFR 761.79(g)(3)
	Shall be disposed of in an incinerator operating in compliance with 40 CFR 761.70, or decontaminated pursuant to this section.	Chlorinated solvent at any concentration PCBs used for decontamination **– applicable**	40 CFR 761.79(g)(4)

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	Shall be disposed of in accordance with 40 CFR 761.60(a), or decontaminated pursuant to this section.	Solvents ≥ 50 ppm PCBs [other than those described in 40 CFR 761.79(g)(3) and (g)(4)] **– applicable**	40 CFR 761.79(g)(5)
	Shall be disposed of in accordance with provisions for wastes from cleanup of PCB remediation waste at 40 CFR 761.61(a)(5)(v).	Non-liquid cleaning materials and PPE at any concentration PCBs, including non-porous surfaces and other non-liquid materials (e.g., rags, gloves, booties) resulting from decontamination **– applicable**	40 CFR 761.79(g)(6)
Disposal of PCB contaminated porous surfaces *(self-implementing option)*	Shall be disposed on-site or off-site as bulk PCB remediation waste according to 40 CFR 761.61(a)(5)(i) or decontaminated for use according to 40 CFR 761.79(b)(4).	PCB remediation waste porous surfaces (as defined in 40 CFR 761.3) **– relevant and appropriate**	40 CFR 761.61(a)(5)(iii)
Disposal liquid PCB remediation waste *(self-implementing option)*	Shall either: • decontaminate the waste to the levels specified in 40 CFR 761.79(b)(1) or (2); or • dispose of the waste in accordance with 40 CFR 761.61(b) or a risk-based approval under 40 CFR 761.61(c).	Liquid PCB remediation waste (as defined in 40 CFR 761.3) **– relevant and appropriate**	40 CFR 761.61(a)(5)(iv) 40 CFR 761.61(a)(5)(iv)(A) and (B)
Disposal of PCB contaminated non-porous surfaces on-site *(self- implementing option)*	Shall be cleaned on-site or off-site to levels in 40 CFR 761.61(a)(4)(ii) using: • decontamination procedures under 40 CFR 761.79; • technologies approved under 40 CFR 761.60(e); or • risk-based procedures/technologies under 40 CFR 761.61(c).	PCB remediation waste *non-porous surfaces* (as defined in 40 CFR 761.3) **– relevant and appropriate**	40 CFR 761.61(a)(5)(ii)(A)(*1*)-(*3*)
Disposal of PCB contaminated non-porous surfaces off-site *(self- implementing option)*	Shall be disposed of in accordance with 40 CFR 761.61(a)(5)(i)(B)(3)(ii) [sic] 40 CFR 761.61 (a)(5)(i)(B)(2)(ii). Metal surfaces may be thermally decontaminated in accordance with 40 CFR 761.79(c)(6)(i).	PCB remediation waste non-porous surfaces (as defined in 40 CFR 761.3) having surface concentrations < 100 $\mu g/cm^2$ **– relevant and appropriate**	40 CFR 761.61 (a)(5)(ii)(B)(*1*)
	Shall be disposed of in accordance with 40 CFR 761.61(a) (5)(i)(B)(3)(iii)[sic] 40 CFR 761.61(a)(5)(i)(B)(2)(iii). Metal surfaces may be thermally decontaminated in accordance with 40 CFR 761.79(c)(6)(ii).	PCB remediation waste non-porous surfaces having surface concentrations ≥ 100 *g/cm^2 **– relevant and appropriate**	40 CFR 761.61(a)(5)(ii)(B)(*2*)

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Disposal of PCB bulk product waste (e.g., building demolition debris) in solid waste landfill	May dispose of in a facility permitted, licensed, or registered by a State as a municipal solid waste or non-municipal non-hazardous waste landfill. Includes Plastics (such as plastic insulation from wire or cable; radio, television and computer casings; vehicle parts; or furniture laminates); preformed or molded rubber parts and components; applied dried paints, varnishes, waxes or other similar coatings or sealants; caulking; Galbestos; non-liquid building demolition debris; or non-liquid PCB bulk product waste from the shredding of automobiles or household appliances from which PCB small capacitors have been removed (shredder fluff).	PCB bulk product waste listed in 40 CFR 761.62(b)(1)(i) including non-liquid building debris **–applicable**	40 CFR 761.62(b)(1)
	May dispose of in a facility permitted, licensed, or registered by a State as a municipal solid waste or non-municipal non-hazardous waste landfill.	Other PCB bulk product waste, sampled in accordance with the protocols set out in subpart R of this part, that leaches PCBs at <10 µg/L of water measured using a procedure used to simulate leachate generation **–applicable**	40 CFR 761.62(b)(1)(ii)
	May dispose of in a facility permitted, licensed, or registered by a State to manage as a municipal solid waste subject to 40 CFR 258 or non-municipal non-hazardous waste subject to 40 CFR 257.5 thru 257.30 if: • the PCB bulk product waste is segregated from organic liquids disposed of in the landfill; and • leachate is collected from the landfill and monitored for PCBs.	Other PCB bulk product waste not meeting conditions of 40 CFR 761.62(b)(1) (*e.g.*, paper/felt gaskets contaminated by liquid PCBs) – **applicable**	40 CFR 761.62(b)(2) 40 CFR 761.62(b)(2)(i) and (ii)
Disposal of PCB bulk product waste in an off-site solid waste landfill	Must provide written notice to the facility 15 days in advance of the first shipment from the same disposal waste stream.	Disposal of PCB bulk product waste regulated under 40 CFR 761.62(b)(1) at a facility without PCB approval – **applicable**	40 CFR 761.62(b)(4)(i)
	The notice shall state that the PCB bulk product waste may include components containing PCBs at ≥*50 ppm based on analysis of the waste in the shipment or general knowledge of the waste stream (or similar material) which is known to contain PCBs at those levels, and the waste is known or presumed to leach < 10 *g/L PCBs.		

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Disposal of PCB bulk product waste in an off-site solid waste landfill *con't*	Must provide written notice to the facility 15 days in advance of the first shipment from the same disposal waste stream and with each shipment thereafter.	Disposal of PCB bulk product waste regulated under 40 CFR 761.62(b)(2) at a facility without PCB approval **– applicable**	40 CFR 761.62(b)(4)(ii)
	The notice shall state that the PCB bulk product waste may include components containing PCBs at ≥50 ppm based on analysis of the waste in the shipment or general knowledge of the waste stream (or similar material) which is known to contain PCBs at those levels, and the waste is known or presumed to leach * 10 *g/L PCBs.		
Disposal of bulk PCB remediation waste off-site *(self-implementing option)*	May be sent off-site for decontamination or disposal provided the waste is either dewatered on-site or transported off-site in containers meeting the requirements of DOT HMR at 49 CFR parts 171-180.	Generation of bulk PCB remediation waste (as defined in 40 CFR 761.3) for disposal **– relevant and appropriate**	40 CFR 761.61(a)(5)(i)(B)
	Must provide written notice including the quantity to be shipped and highest concentration of PCBs [using extraction EPA Method 3500B/3540C or Method 3500B/3550B followed by chemical analysis using Method 8082 in SW-846 or methods validated under 40 CFR 761.320-26 (Subpart Q)] at least 15 days before the first shipment of waste to each off-site facility	Generation of bulk PCB remediation waste (as defined in 40 CFR 761.3) for disposal at an off-site facility where the waste is destined for an area not subject to a TSCA PCB Disposal Approval **– relevant and appropriate**	40 CFR 761.61(a)(5)(i)(B)(2)*(iv)*
	Shall be disposed of in accordance with the provisions for Cleanup wastes at 40 CFR 761.61(a)(5)(v)(A).	Bulk PCB remediation waste which has been de-watered and with a PCB concentration < 50 ppm **– relevant and appropriate**	40 CFR 761.61(a)(5)(i)(B)(2)*(ii)*
	Shall be disposed of: • in a hazardous waste landfill permitted by EPA under §3004 of RCRA; • in a hazardous waste landfill permitted by a State authorized under §3006 of RCRA; or • in a PCB disposal facility approved under 40 CFR 761.60.	Bulk PCB remediation waste which has been de-watered and with a PCB concentration ≥ 50 ppm **– relevant and appropriate**	40 CFR 761.61(a)(5)(i)(B)(2)*(iii)*

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Performance-based disposal of PCB remediation waste	Shall dispose by one of the following methods: • in a high-temperature incinerator approved under 40 CFR 761.70(b); • by an alternate disposal method approved under 40 CFR 761.60(e); • in a chemical waste landfill approved under 40 CFR 761.75; • in a facility with a coordinated approval issued under 40 CFR 761.77; or • through decontamination in accordance with 40 CFR 761.79.	Disposal of non-liquid PCB remediation waste (as defined in 40 CFR 761.3) **– relevant and appropriate**	40 CFR 761.61(b)(2) 40 CFR 761.61(b)(2)(i) 40 CFR 761.61(b)(2)(ii)
	Shall be disposed according to 40 CFR 761.60(a) or (e), or decontaminate in accordance with 40 CFR 761.79.	Disposal of liquid PCB remediation waste **– relevant and appropriate**	40 CFR 761.61(b)(1)
Risk-based storage or disposal of PCB remediation waste	Any person wishing to sample, cleanup, or dispose of PCB remediation waste in a manner other than prescribed in 40 CFR 761.61(a) or (b), or store PCB remediation waste in a manner other than prescribed in 40 CFR 761.65 must apply in writing to the EPA Regional Administrator. Each application must include information required by 40 CFR 761.61(a)(3). EPA may request other information that it believes is necessary to evaluate the application. *NOTE: Application information for EPA approval of alternative storage or disposal method can be provided in the RI/FS or other CERCLA remedy selection documents.*	Generation of PCB remediation waste for cleanup, storage and/or disposal **– relevant and appropriate**	40 CFR 761.61(c)(1)
	EPA will issue a written decision on each application for risk-based method for PCB remediation wastes. EPA will approve such application if it finds that method will not pose an unreasonable risk of injury to [sic] human health or the environment. *NOTE: EPA written decision on an application for alternative storage or disposal method will be documented in the CERCLA decision document (e.g., ROD or Action Memorandum).*	Generation of PCB remediation waste for cleanup, storage and/or disposal **– relevant and appropriate**	40 CFR 761.61(c)(2)

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Disposal of PCB cleanup wastes (e.g., PPE, rags, non-liquid cleaning materials) *(self- implementing option)*	Shall be disposed of either: • in a facility permitted, licensed or registered by a State to manage municipal solid waste under 40 CFR 258 or non-municipal, non-hazardous waste subject to 40 CFR 257.5 thru 257.30; or • in a RCRA Subtitle C landfill permitted by a State to accept PCB waste; or • in an approved PCB disposal facility; or • through decontamination under 40 CFR 761.79(b) or (c).	Generation of non-liquid PCBs at any concentration during and from the cleanup of PCB remediation waste – **relevant and appropriate**	40 CFR 761.61(a)(5)(v)(A)(*1*)-(*4*)
Disposal of PCB cleaning solvents, abrasives, and equipment *(self-implementing option)*	May be reused after decontamination in accordance with 40 CFR 761.79; or For liquids, disposed in accordance with 40 CFR 761.60(a).	Generation of PCB wastes from the cleanup of PCB remediation waste – **relevant and appropriate**	40 CFR 761.61(a)(5)(v)(B) 40 CFR 761.60(b)(1)(i)(B)
Disposal of PCB liquids (e.g., transformer fluid)	Must be disposed of in an incinerator which complies with 40 CFR 761.70, except:	PCB liquids at concentrations ≥50 ppm – **applicable**	40 CFR 761.60(a)
	For mineral oil dielectric fluid, may be disposed in a high efficiency boiler according to 40 CFR 761.71(a).	PCB liquids at concentrations ≥ 50 ppm and < 500 ppm – **applicable**	40 CFR 761.60(a)(1)
	For liquids other than mineral oil dielectric fluid, may be disposed in a high efficiency boiler according to 40 CFR 761.71(b).		40 CFR 761.60(a)(2)
Disposal of PCB contaminated precipitation, condensation, leachate, or load separation	May be disposed in a chemical waste landfill which complies with 40 CFR 761.75 if: • disposal does not violate 40 CFR 268.32(a) or 268.42(a)(1); • liquids do not exceed 500 ppm PCB and are not an ignitable waste as described in 40 CFR 761.75(b)(8)(iii).	PCB liquids at concentrations ≥ 50 ppm and **500 ppm from incidental sources and associated with PCB Articles or non-liquid PCB wastes – **applicable**	40 CFR 761.60(a)(3) 40 CFR 761.60(a)(3)(i) and (ii)
Disposal of PCB Transformers	Shall be disposed of in either: • an incinerator that complies with 40 CFR 761.70; or • a chemical waste landfill approved under 40 CFR 761.75; provided all free flowing liquid and solvent (allowed to stand for 18 hrs to decontaminate transformer) is removed.	PCB Contaminated Electrical Equipment (including transformers that contain PCBs at concentrations of ≥ 50 ppm and **500 ppm in the contaminating fluid) as defined in 40 CFR 761.3 – **applicable**	40 CFR 761.60(b)(1) 40 CFR 761.60(b)(1)(i)(A) 40 CFR 761.60(b)(1)(i)(B)

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Performance-based disposal of PCB bulk product waste	May dispose of by one of the following: • in an incinerator approved under 40 CFR 761.70; • in a chemical waste landfill approved under 40 CFR 761.75; • in a hazardous waste landfill permitted by EPA under §3004 of RCRA or by authorized state under §3006 of RCRA; • under alternate disposal approved under 40 CFR 761.60(e); • in accordance with decontamination provisions of 40 CFR 761.79; or • in accordance with thermal decontamination provisions of 40 CFR 761.79(c)(6) for metal surfaces in contact with PCBs.	Disposal of PCB bulk product waste as defined in 40 CFR 761.3 – **applicable**	40 CFR 761.62(a) 40 CFR 761.62(a)(1)-(6)
Risk-based disposal of PCB bulk product waste	May dispose of in a manner other than prescribed in 40 CFR 761.62(a) or (b) if receive approval in writing from EPA Regional Administrator and EPA finds that the method (based on technical, environmental or waste specific characteristics or considerations) will not pose an unreasonable risk of injury to human health or the environment.	Disposal of PCB bulk product waste – **applicable**	40 CFR 761.62(c)
Decontamination and Cleanup Levels			
Decontamination of PCB contaminated water	For discharge to a treatment works as defined in 40 CFR 503.9 (aa), or discharge to navigable waters, meet standard of < 3 ppb PCBs; or	Water containing PCBs regulated for disposal – **applicable**	40 CFR 761.79(b)(1)(ii)
	For unrestricted use, meet standard of ≤ 0.5 ppb PCBs.		40 CFR 761.79(b)(1)(iii)
Decontamination of PCB contaminated liquids	Meet standard of < 2 ppm PCBs.	Organic liquids and non-aqueous inorganic liquids containing PCBs – **applicable**	40 CFR 761.79(b)(2)
Decontamination of PCB non-porous surface (e.g., scrap metal)	For unrestricted use, meet standard of: • ≤10 *g/100 cm^2 as measured by a standard wipe test; (40 CFR 761.123) at locations selected in accordance with 40 CFR 761.300 et seq.	Non-porous surfaces previously in contact *with liquid PCBs*, where no free-flowing liquids are present – **applicable**	40 CFR 761.79(b)(3)(i)(A)
	Clean to Visual Standard No. 2 of NACE. Verify compliance by visually inspecting all cleaned areas.	Non-porous surfaces in contact *with non-liquid PCBs* (e.g. paint or coating on metal) – **applicable**	40 CFR 761.79(b)(3)(i)(B)

Table - List of ARARs for Management of PCBs and PCB Remediation Waste

	For disposal in a smelter operating in accordance with 40 CFR 761.72(b), meet standard of: • < 100 *g/ 100 cm^2 as measured by standard wipe test under 761.123 at locations selected in accordance with 40 CFR 761.300 et seq.	Non-porous surfaces previously in contact *with liquid PCBs* at any concentration, where no free-flowing liquids are present **– applicable**	40 CFR 761.79 (b)(3)(ii)(A)
	Clean to a visual standard No. 3 of NACE and verify compliance by visually inspecting all cleaned areas.	Non-porous surfaces in contact *with non-liquid PCBs* (including non-porous surfaces covered with a porous surface, e.g., paint or coating on metal) **– applicable**	40 CFR 761.79(b)(3)(ii)(B)
Decontamination of PCB contaminated concrete	If commenced within 72 hours of initial spill, 10 ug/100 cm2 as measured by the standard wipe test (40 CFR 761.123).	Spill of liquid PCBs – **applicable**	40 CFR 761.79(b)(4)
Decontamination of PCB Containers *(self-implementing option)*	Must flush the internal surfaces of the container three times with a solvent containing < 50 ppm PCBs. Each rinse shall use a volume of the flushing solvent equal to approximately 10% of the PCB container capacity.	PCB Container (as defined in 40 CFR 761.3) **– relevant and appropriate**	40 CFR 761.79(c)(1)
Decontamination of movable equipment contaminated by PCBs *(self-implementing option)*	May decontaminate by: • swabbing surfaces that have contacted PCBs with a solvent; • a double wash/rinse as defined in 40 CFR 761.360-378; or • another applicable decontamination procedure under 40 CFR 761.79.	Movable equipment contaminated by PCBs and used in storage areas, tools and sampling equipment **– relevant and appropriate**	40 CFR 761.79(c)(2)
Decontamination of metal surfaces in contact with PCBs *(self-implementing option)*	For surfaces in contact with liquid or non-liquid PCBs < 500 ppm, may be decontaminated in an industrial furnace for purposes of disposal in accordance with 40 CFR 761.72.	Use of thermal processes to decontaminate metal surfaces as required by 40 CFR 761.62(a)(6) **– relevant and appropriate**	40 CFR 761.79(c)(6)(i)
	For surfaces in contact with liquid or non-liquid PCBs ≥ 500 ppm, may be smelted in an industrial furnace operating in accordance with 40 CFR 761.72(b), but must first be decontaminated in accordance with 40 CFR 761.72(a) or to a surface concentration of < 100 *g/100 cm^2.		40 CFR 761.79(c)(6)(ii)
Cleanup of non-porous surfaces with PCBs *(self-implementing option)*	In high-occupancy areas, the PCB cleanup standard is ≤ 10 *g/100 cm^2 of surface area.	PCB remediation waste *non-porous surfaces* (as defined in 40 CFR 761.3) **– relevant and appropriate**	40 CFR 761.61(a)(4)(ii)
	In low occupancy areas, the PCB cleanup standard is < 100 *g/100 cm^2 of surface area.		
	Select sampling locations in accordance with 40 CFR 761.300 et seq. or sampling plan approved under 40 CFR 761.61(c).		

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	For use, shall be decontaminated on-site or off-site to the standards specified in 40 CFR 761.79(b)(3) or 761.79(c).		40 CFR 761.61(a)(5)(ii)(C)
Cleanup of porous surfaces with PCBs *(self-implementing option)*	In both high and low occupancy areas, any person disposing of such, must do so based on the levels in 40 CFR 761.61(a)(4)(i). May be cleaned up for use in accordance with 40 CFR 761.79(b)(4) or 761.30(p).	PCB remediation waste *porous surfaces* (as defined in 40 CFR 761.3) on which PCBs have been spilled – **relevant and appropriate**	40 CFR 761.61(a)(4)(iii)
Cleanup verification *(self-implementing options)*	Must collect and analyze the wastes in accordance with 40 CFR 761.280-298 (Subpart O).	Collection and analysis of samples to verify cleanup and on-site disposal of bulk PCB remediation wastes and porous surfaces – **relevant and appropriate**	40 CFR 761.61(a)(6)(i)
	Must collect and analyze the waste in accordance with 40 CFR 761.300-316 (Subpart P).	Collection and analysis of samples from PCB remediation waste non-porous surfaces – **relevant and appropriate**	
	Must collect and analyze the waste in accordance with 40 CFR 761.269.	Collection and analysis of samples from liquid PCB remediation waste – **relevant and appropriate**	
	May use PCB field screening tests to determine when to sample to verify that cleanup is complete.	Interim sampling during PCB remediation waste cleanup – **relevant and appropriate**	
	Self-implementing cleanup of PCB remediation waste is complete.	Sample analysis results in measurement of PCBs less than or equal to levels specified in 40 CFR 761.61(a) – **relevant and appropriate**	40 CFR 761.61(a)(6)(ii)(A)
	Cleanup is not complete and must either dispose of the sampled PCB remediation waste, or reclean the waste represented by the sample and reinitiate sampling and analysis in accordance with 40 CFR 761.61(a)(6)(i).	Sample analysis results in measurement of PCBs greater than or equal to levels specified in 40 CFR 761.61(a) – **relevant and appropriate**	40 CFR 761.61(a)(6)(ii)(B)

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Cleanup of bulk PCB remediation waste on-site *(self-implementing option)*	May do so subject to all of the following: • a non-chlorinated solvent is used; • the process occurs at ambient temperature; • the process is not exothermic; • the process uses no external heat; • the process has secondary contaminant to prevent any solvent from being released to the underlying or surrounding soils or surface waters; and • solvent disposal, recovery, and/or reuse is in accordance with relevant provisions of 40 CFR 761.61(b)(1) or 761.61(c) or applicable paragraphs of 40 CFR 761.79	Cleanup of PCB remediation waste on-site <u>or</u> using a soil washing process – **relevant and appropriate**	40 CFR 761.61(a)(5)(i)(A) 40 CFR 761.61(a)(5)(i)(A)(1)-(6)
Bulk PCB remediation waste left in place *(self-implementing option)*	May remain onsite without further conditions.	Bulk PCB remediation waste remaining in a *high occupancy area* (as defined in 40 CFR 761.3) at concentrations ≤1 ppm – **relevant and appropriate**	40 CFR 761.61(a)(4)(i)(A)
	Shall be covered with a cap meeting the requirements of 40 CFR 761.61(a)(7) and 40 CFR 761.61(a)(8) [*See below*].	Bulk PCB remediation waste remaining in a *high occupancy area* (as defined in 40 CFR 761.3) at concentrations > 1 ppm and ≤10 ppm – **relevant and appropriate**	40 CFR 761.61(a)(4)(i)(A)
	May remain onsite without further conditions.	Bulk PCB remediation waste remaining in a *low occupancy area* (as defined in 40 CFR 761.3) at concentrations ≤ 25 – **relevant and appropriate**	40 CFR 761.61(a)(4)(i)(B)(1)
	May remain on-site if the site is secured by a fence and marked with a sign including the M_L mark.	Bulk PCB remediation waste remaining in a *low occupancy area* (as defined in 40 CFR 761.3) at concentrations > 25 ppm and ≤ 50 ppm – **relevant and appropriate**	40 CFR 761.61(a)(4)(i)(B)(2)
	May remain onsite if the site is covered with a cap meeting the requirements of 40 CFR 761.61(a)(7) and (8). [*See below*]	Bulk PCB remediation waste remaining in a *low occupancy area* (as defined in 40 CFR 761.3) at concentrations > 50 ppm and ≤ 100 ppm – **relevant and appropriate**	40 CFR 761.61(a)(4)(i)(B)(3)

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Cap requirements for Bulk PCB remediation waste left-in-place *(self-implementing option)*	Must do so in accordance with 40 CFR 264.310(a) and ensure it complies with the permeability, sieve, liquid limit and plasticity index parameters in 40 CFR 761.75(b)(1)(ii) thru (b)(1)(v).	Designing and constructing a cap for on-site disposal of PCB remediation waste **– relevant and appropriate**	40 CFR 761.61(a)(7)
	Must be of sufficient strength to maintain its effectiveness and integrity during use of the cap surface which is exposed to the environment.		
	May not be contaminated at a level ≥1 ppm PCBs.		
	A cap of compacted soil shall have a minimum thickness of 15 cm (10 inches).		
	A concrete or asphalt cap shall have a minimum thickness of 15 cm (6 inches).		
	Repairs shall begin within 72 hours of discovery for any breaches which would impair the integrity of the cap.		
Institutional Controls			
Deed restrictions for caps, fences and low occupancy areas *(self-implementing option)*	Must maintain the fence or cap, in perpetuity.	Use of a cap or fence at PCB remediation waste cleanup site – **relevant and appropriate**	40 CFR 761.61(a)(8)
Deed restrictions for caps, fences and low occupancy areas *con't* *(self-implementing option)*	Within 60 days of completion of cleanup activity shall record, in accordance with State law, a notation on the deed to the property, or on some other instrument which is normally examined during a title search, that will in perpetuity notify any potential purchaser of the property: • that land has been used for PCB remediation waste disposal and is restricted to use as a low occupancy area as defined in 40 CFR 761.3. • of existence of the fence or cap and the requirements to maintain the fence or cap. • the applicable cleanup levels left at the site, inside the fence, and/or under the cap.	Use of a cap or fence at low occupancy PCB remediation waste cleanup site **– relevant and appropriate**	40 CFR 761.61(a)(8)(i)(A)(1)-(3)
Modification of fence or cap *(self-implementing option)*	May remove a fence or cap after conducting additional cleanup activities and achieving levels specified in 40 CFR 761.61(a)(4) which do not require a cap or fence and remove the notice on the deed no earlier than 30 days after achieving these levels.	Use of a cap or fence at PCB remediation waste cleanup site – **relevant and appropriate**	40 CFR 761.61(a)(8)(ii)
Transportation			
Transportation of PCB wastes off-site	Must comply with the manifesting provisions at 40 CFR 761.207 through 218.	Relinquishment of control over PCB wastes by transporting, or offering for transport **–applicable**	40 CFR 761.207(a)

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Transportation of hazardous materials	Shall be subject to and must comply with all applicable provisions of the HMTA and DOT HMR at 49 CFR 171-180.	Any person who, under contract with an department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material **– applicable**	49 CFR 171.1(c)

ARAR = applicable or relevant and appropriate requirement
CFR = *Code of Federal Regulations*
DOT = U.S. Department of Transportation
> = greater than
< = less than
≥ = greater than or equal to
≤ = less than or equal to
HMR = Hazardous Materials Regulations
HMTA = Hazardous Materials Transportation Act
PCB = polychlorinated biphenyl
PPE = personal protective equipment
RCRA = Resource Conservation and Recovery Act of 1976
TSCA = Toxic Substances Control Act of 1976